

Food: The Weak Link

The world is in transition from an era of food abundance to one of scarcity. Over the last decade, world grain reserves have fallen by one third. World food prices have more than doubled, triggering a worldwide land rush and ushering in a new geopolitics of food. Food is the new oil. Land is the new gold.¹

The abrupt rise in world grain prices between 2007 and 2008 left more people hungry than at any time in history. It also spawned numerous food protests and riots. In Thailand, rice was so valuable that farmers took to guarding their ripened fields at night. In Egypt, fights in the long lines for state-subsidized bread led to six deaths. In poverty-stricken Haiti, days of rioting left five people dead and forced the Prime Minister to resign. In Mexico, the government was alarmed when huge crowds of tortilla protestors took to the streets.²

After the doubling of world grain prices between 2007 and mid-2008, prices dropped somewhat during the recession, but this was short-lived. Three years later, high food prices helped fuel the Arab Spring.³

We are entering a new era of rising food prices and spreading hunger. On the demand side of the food equation, population growth, rising affluence, and the conver-

sion of food into fuel for cars are combining to raise consumption by record amounts. On the supply side, extreme soil erosion, growing water shortages, and the earth's rising temperature are making it more difficult to expand production. Unless we can reverse such trends, food prices will continue to rise and hunger will continue to spread, eventually bringing down our social system. Can we reverse these trends in time? Or is food the weak link in our early twenty-first-century civilization, much as it was in so many of the earlier civilizations whose archeological sites we now study?

This tightening of world food supplies contrasts sharply with the last half of the twentieth century, when the dominant issues in agriculture were overproduction, huge grain surpluses, and access to markets by grain exporters. During that time, the world in effect had two reserves: large carryover stocks of grain (the amount in the bin when the new harvest begins) and a large area of cropland idled under U.S. farm programs to avoid overproduction. When the world harvest was good, the United States would idle more land. When the harvest was subpar, it would return land to production. The excess production capacity was used to maintain stability in world grain markets. The large stocks of grain cushioned world crop shortfalls. When India's monsoon failed in 1965, for example, the United States shipped a fifth of its wheat harvest to India to avert a potentially massive famine. And because of abundant stocks, this had little effect on the world grain price.⁴

When this period of food abundance began, the world had 2.5 billion people. Today it has 7 billion. From 1950 to 2000 there were occasional grain price spikes as a result of weather-induced events, such as a severe drought in Russia or an intense heat wave in the U.S. Midwest. But their effects on price were short-lived. Within a year or so things were back to normal. The combination of abun-

dant stocks and idled cropland made this period one of the most food-secure in world history. But it was not to last. By 1986, steadily rising world demand for grain and unacceptably high budgetary costs led to a phasing out of the U.S. cropland set-aside program.⁵

Today the United States has some land idled in its Conservation Reserve Program, but it targets land that is highly susceptible to erosion. The days of productive land ready to be quickly brought into production when needed are over.⁶

Ever since agriculture began, carryover stocks of grain have been the most basic indicator of food security. The goal of farmers everywhere is to produce enough grain not just to make it to the next harvest but to do so with a comfortable margin. From 1986, when we lost the idled cropland buffer, through 2001, the annual world carryover stocks of grain averaged a comfortable 107 days of consumption.⁷

This safety cushion was not to last either. After 2001, the carryover stocks of grain dropped sharply as world consumption exceeded production. From 2002 through 2011, they averaged only 74 days of consumption, a drop of one third. An unprecedented period of world food security has come to an end.⁸

When world grain supplies tightened in 2007, there was no idled U.S. cropland to quickly return to production and there were no excess grain stocks to draw upon. Within two decades, the world had lost both of its safety cushions.

The world is now living from one year to the next, hoping always to produce enough to cover the growth in demand. Farmers everywhere are making an all-out effort to keep pace with the accelerated growth in demand, but they are having difficulty doing so.

Today the temptation for exporting countries to re-

strict exports in order to dampen domestic food price rises is greater than ever. With another big jump in grain prices, we could see a breakdown in the world food supply system. If countries give in to the temptation to restrict exports, some lower-income importing countries might not be able to import any grain at all. When could this happen? We are not talking about the distant future. It could be anytime.

Food shortages undermined earlier civilizations. The Sumerians and Mayans are just two of the many early civilizations that declined apparently because they moved onto an agricultural path that was environmentally unsustainable. For the Sumerians, rising salt levels in the soil as a result of a defect in their otherwise well-engineered irrigation system eventually brought down their food system and thus their civilization. For the Mayans, soil erosion was one of the keys to their downfall, as it was for so many other early civilizations. We, too, are on such a path. While the Sumerians suffered from rising salt levels in the soil, our modern-day agriculture is suffering from rising carbon dioxide levels in the atmosphere. And like the Mayans, we too are mismanaging our land and generating record losses of soil from erosion.⁹

While the decline of early civilizations can be traced to one or possibly two environmental trends such as deforestation and soil erosion that undermined their food supply, we are now dealing with several. In addition to some of the most severe soil erosion in human history, we are also facing newer trends such as the depletion of aquifers, the plateauing of grain yields in the more agriculturally advanced countries, and rising temperature.

Against this backdrop, it is not surprising that the U.N. Food Price Index was at 201 in June 2012, twice the base level of 100 in 2002–04. (See Figure 1–1.) For most Americans, who spend on average 9 percent of their income on

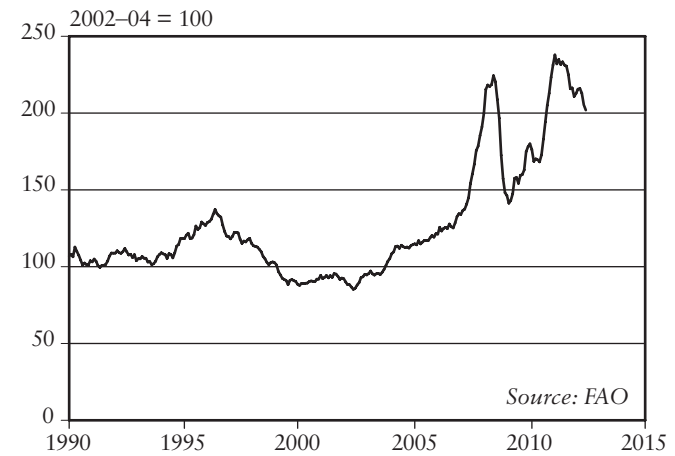


Figure 1–1. World Monthly Food Price Index, January 1990–June 2012

food, this is not a big deal. But for consumers who spend 50–70 percent of their income on food, a doubling of food prices is a serious matter. There is little latitude for them to offset the price rise simply by spending more.¹⁰

Closely associated with the decline in stocks of grain and the rise in food prices is the spread of hunger. During the closing decades of the last century, the number of hungry people in the world was falling, dropping to a low of 792 million in 1997. After that it began to rise, climbing toward 1 billion. Unfortunately, if we continue with business as usual, the ranks of the hungry will continue to expand.¹¹

Those trapped between low incomes and the doubling of world food prices are forced to eat less. Most of the nearly 1 billion people who are chronically hungry and malnourished live in the Indian subcontinent or sub-Saharan Africa. There are pockets of hunger elsewhere, but these are the two remaining regions where hunger is pervasive. India, which now has a thriving economy, should

be experiencing a steady decline in the number who are hungry and malnourished. But it is not, presumably because rising incomes among the poor cannot keep up with rising food prices.¹²

In a hungry world, it is children who suffer the most. Rising world food prices are leaving millions of children dangerously hungry. Some are too weak to walk to school. Many are so nutritionally deprived that they are physically and mentally stunted. Neither we nor they will ever know what their full human potential could be. The costs of this will be visible for decades to come.¹³

As a result of chronic hunger, 48 percent of all children in India are stunted physically and mentally. They are undersized, underweight, and likely to have IQs that are on average 10–15 points lower than those of well-nourished children.¹⁴

In early 2012, Adam Nossiter wrote in the *New York Times* about the effect of high food prices in the Democratic Republic of the Congo, a country where hunger is common. Interviewing individual families in Kinshasa, he noted that three years ago everyone ate at least one meal a day. But today even families with both parents working often cannot afford to eat every day. It is now a given in many households that some days will be foodless, days when they will not eat at all. Selecting the days when they will not eat is a weekly routine.¹⁵

The international charity Save the Children commissioned detailed surveys in five countries—India, Pakistan, Nigeria, Peru, and Bangladesh—to see how people were dealing with rising food prices. Among other things, they learned that 24 percent of families in India now have foodless days. For Nigeria, the comparable figure is 27 percent. For Peru it is 14 percent. Family size plays an important role in hunger. Almost one third of large families in all countries surveyed have foodless days.¹⁶

Historically there have been two sources of grain demand growth. The oldest of these is population growth. Each year the world adds nearly 80 million people. Tonight there will be 219,000 people at the dinner table who were not there last night, many of them with empty plates. Tomorrow night there will be another 219,000 people. Relentless population growth is putting excessive pressure on local land and water resources in many countries, making it difficult if not impossible for farmers to keep pace.¹⁷

The second source of growing demand for grain is consumers moving up the food chain. As incomes rose in industrial countries after World War II, people began to consume more grain-intensive livestock and poultry products: meat, milk, and eggs. Today, with incomes rising fast in emerging economies, there are at least 3 billion people moving up the food chain in the same way. The largest single concentration of these new meat eaters is in China, which now consumes twice as much meat as the United States does.¹⁸

Now there is a third source of demand for grain: the automobile. Distillers use grain to produce fuel ethanol for cars, an activity that is concentrated in the United States and that has developed largely since 2005. In 2011, the United States harvested nearly 400 million tons of grain. Of this, 127 million tons (32 percent) went to ethanol distilleries.¹⁹

With this massive industrial capacity to convert grain into automotive fuel, the price of grain is now more closely linked to the price of oil than ever before. As the price of oil rises, it becomes more profitable to convert grain into ethanol. This sets the stage for competition for the grain harvest between the affluent owners of the world's 1 billion automobiles and the world's poorest people.²⁰

Population growth, the rising consumption of livestock and poultry products, and the use of grain to fuel cars to-

gether raised the world growth in grain consumption from an average of 21 million tons per year from 1990 to 2005 to 45 million tons per year from 2005 to 2011. Almost overnight, the annual growth in grain consumption doubled.²¹

At a time when the world's farmers are facing this record growth in food demand, they continue to wrestle with the traditional threats to production such as soil erosion. But now they are also looking at three new challenges on the production front. One, aquifers are being depleted and irrigation wells are starting to go dry in 18 countries that together contain half the world's people. Two, in some of the more agriculturally advanced countries, rice and wheat yield per acre, which have been rising steadily for several decades, are beginning to plateau. And three, the earth's temperature is rising, threatening to disrupt world agriculture in scary ways.²²

The countries where water tables are falling and aquifers are being depleted include the big three grain producers—China, India, and the United States. World Bank data for India indicate that 175 million people are being fed with grain produced by overpumping. My own estimate for China is that 130 million people are being fed by overpumping. In the United States, the irrigated area is shrinking in leading agricultural states such as California and Texas as aquifers are depleted and irrigation water is diverted to cities.²³

Second, after several decades of rising grain yields, some of the more agriculturally advanced countries are hitting a glass ceiling, a limit that was not widely anticipated. Rice yields in Japan, which over a century ago became the first country to launch a sustained rise in land productivity, have not increased for 17 years. In both Japan and South Korea, yields have plateaued at just under 5 tons per hectare. (One hectare = 2.47 acres.) China's rice yields, rising rapidly in recent decades, are now closely ap-

proaching those of Japan. If China cannot raise its rice yields above those in Japan, and it does not seem likely that it can, then a plateauing there too is imminent.²⁴

A similar situation exists with wheat yields. In France, Germany, and the United Kingdom—the three leading wheat producers in Europe—there has been no rise for more than a decade. Other advanced countries will soon be hitting their glass ceiling for grain yields.²⁵

The third new challenge confronting farmers is global warming. The massive burning of fossil fuels is increasing the level of carbon dioxide in the atmosphere, raising the earth's temperature and disrupting climate. It is now in a state of flux. Historically when there was an extreme weather event—an intense heat wave or a drought—we knew it was temporary and that things would likely be back to normal by the next harvest. Now there is no “norm” to return to, leaving farmers facing a future fraught with risk.²⁶

High temperatures can lower crop yields. The widely used rule of thumb is that for each 1-degree-Celsius rise in temperature above the optimum during the growing season farmers can expect a 10-percent decline in grain yields. A historical study of the effect of temperature on corn and soybean yields in the United States found that a 1-degree-Celsius rise in temperature reduced grain yields 17 percent. Yet if the world continues with business as usual, failing to address the climate issue, the earth's temperature during this century could easily rise by 6 degrees Celsius (11 degrees Fahrenheit).²⁷

In recent years, world carryover stocks of grain have been, only slightly above the 70 days that was considered a desirable minimum during the late twentieth century. Now stock levels must take into account the effect on harvests of higher temperatures, more extensive drought, and more intense heat waves. Although there is no easy way to pre-

cisely quantify the harvest effects of any of these climate-related threats, it is clear that any of them can shrink harvests, potentially creating chaos in the world grain market. To mitigate this risk, a stock reserve equal to 110 days of consumption would produce a much safer level of food security.²⁸

Although we talk about food price spikes, what we are more likely starting to see is a ratcheting upward of food prices. This process is likely to continue until we succeed in reversing some of the trends that are driving it. All of the threatening trends are of human origin, but whether we can reverse them remains to be seen.

As food supplies tighten, the geopolitics of food is fast overshadowing the geopolitics of oil. The first signs of trouble came in 2007, when world grain production fell behind demand. Grain and soybean prices started to climb, doubling by mid-2008. In response, many exporting countries tried to curb rising domestic food prices by restricting exports. Among them were Russia and Argentina, two leading wheat exporters. Viet Nam, the world's number two rice exporter, banned exports entirely in the early months of 2008. Several other smaller grain suppliers also restricted exports.²⁹

With key suppliers restricting or banning exports, importing countries panicked. No longer able to rely on the market for grain, several countries tried to negotiate long-term grain supply agreements with exporting countries. The Philippines, a chronically rice-deficit country, attempted to negotiate a three-year agreement with Viet Nam for 1.5 million tons of rice per year. A delegation of Yemenis traveled to Australia with a similar goal in mind for wheat, but they had no luck. In a seller's market, exporters were reluctant to make long-term commitments.³⁰

Fearing they might not be able to buy needed grain from the market, some of the more affluent countries, led

by Saudi Arabia, China, and South Korea, then took the unusual step of buying or leasing land long term in other countries on which to grow food for themselves. These land acquisitions have since grown rapidly in number. Most of them are in Africa. Among the principal destinations for land hunters are Ethiopia, Sudan, and South Sudan, each of them countries where millions of people are being sustained with food donations from the U.N. World Food Programme.³¹

As of mid-2012, hundreds of land acquisition deals had been negotiated or were under negotiation, some of them exceeding a million acres. A 2011 World Bank analysis of these "land grabs" reported that at least 140 million acres were involved—an area that exceeds the cropland devoted to corn and wheat combined in the United States. This onslaught of land acquisitions has become a land rush as governments, agribusiness firms, and private investors seek control of land wherever they can find it. Such acquisitions also typically involve water rights, meaning that land grabs potentially affect downstream countries as well. Any water extracted from the upper Nile River basin to irrigate newly planted crops in Ethiopia, Sudan, or South Sudan, for instance, will now not reach Egypt, upending the delicate water politics of the Nile by adding new countries that Egypt must compete with for water.³²

The potential for conflict is high. Many of the land deals have been made in secret, and much of the time the land involved was already being farmed by villagers when it was sold or leased. Often those already farming the land were neither consulted nor even informed of the new arrangements. And because there typically are no formal land titles in many developing-country villages, the farmers who lost their land have had little support for bringing their cases to court.³³

The bottom line is that it is becoming much more dif-

difficult for the world's farmers to keep up with the world's rapidly growing demand for grain. World grain stocks were drawn down a decade ago and we have not been able to rebuild them. If we cannot do so, we can expect that with the next poor harvest, food prices will soar, hunger will intensify, and food unrest will spread. We are entering a time of chronic food scarcity, one that is leading to intense competition for control of land and water resources—in short, a new geopolitics of food.

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