World Food Crisis (Part II: The Bad News -- and the Case of Africa)

By ACSH Staff — August 26, 2008

In spite of the unimaginable global transformations described in my blog post yesterday, per capita food production and consumption in many parts of Africa has actually declined. Unless there is a massive infusion of aid (from the Gates Foundation and others) for seeds, fertilizer, and infrastructure, the situation could get worse, since in many regions of Africa, farmers are taking more nutrients out of the soil than they are returning. They are mining the soil and destroying its structure.

This is "organic agriculture" as practiced by the poor who can not afford synthetic fertilizer, improved seeds and pesticides.

It is sustainable in the sense described by C.S. Prakash: "Organic farming is sustainable. It sustains poverty and malnutrition."

However much better conditions are today than in decades past, 9.7 million children are dying each year, most of them from preventable diseases, and that is unacceptable. Having 860 million people in poverty and hunger is equally unacceptable. To reduce or eliminate hunger; provide more diverse diets of meat, milk, eggs, fruit, vegetables, etc.; and accommodate an expected population of around 9 billion in 2040 (after which population should level off if not decline), it will be necessary to about double the 2000 level of food production -- a task comparable to the 1960-2000 growth in food production.

Challenges to Increasing Food Production

Grains provide about two thirds of the daily caloric needs of the world's population. Land under cultivation to grain peaked around 1980 and has declined since then, while total land for all forms of cultivation has remained relatively constant since the mid-1990s. Once again, increases in yields will have to be the driving force of this growth. This is going to be difficult for the following reasons:

1) I think most of us would not wish to further reduce rainforests or take any other actions in the course of bringing land under cultivation that would reduce biodiversity significantly. Essentially, that leaves areas like the Campos Cerrado in Brazil and similar lands that can be and are being brought under cultivation with crops developed by Brazil that can survive in soils with very low pH and other deficiencies. Increasing food production has had its environmental costs, which are being addressed, but current conditions are making that more difficult.

2) Global warming (whether the result of natural weather cycles or anthropogenic causes) will seriously complicate efforts to improve food production and may worsen growing conditions in
most parts of the world except now-cold climates. Whatever else, weather patterns appear to be becoming more erratic, with many of the unexpected climatic conditions being adverse to agriculture or at least agriculture in tropical Africa, where improvement is desperately needed.

3) There has been a slowing of yield increase over the last few years as much of the potential of conventional breeding has been achieved. There are still possibilities for increased yields, with some being spectacular. We can hope that they are realized, but we cannot depend upon them.

4) The greatest promise for improved food and agriculture production can be found in transgenic technology using rDNA. Unfortunately, a systematic global anti-science, anti-technology campaign of misinformation by groups such as Greenpeace and Friends of the Earth has successfully frightened European and other consumers and thereby has greatly complicated the potential advances using rDNA transgenics (GMOs) and delayed the introduction of vitamin A-enhanced rice. In peer-reviewed articles in leading publications in India and elsewhere, it is estimated that if every other rice meal children in India was vitamin A-enhanced, it would save 40,000 of the 70,000 children's lives lost each year in India because of vitamin A deficiency. The NGO-led regulatory delays in India of about six years will result in 240,000 children losing their lives.

Per one report: "According to our calculations, the current annual disease burden of [vitamin A deficiency (VAD)] in India amounts to a loss of 2.3 million DALYs [disability-adjusted life years], of which 2.0 million are lost due to child mortality alone. In terms of incidence numbers, >70,000 Indian children under the age of six die each year due to VAD. In this context, widespread consumption of Golden Rice 2 with a high beta-carotene content could reduce the burden of VAD by 59%, whereas under pessimistic assumptions the burden would be reduced by 9%. In both scenarios, thousands of lives could be saved. As the severity of VAD is negatively correlated with income, the positive effects of Golden Rice 2 are most pronounced in the lowest income groups." (Stein, Alexander J; H.P.S. Sachdev and Matin Qaim. Potential impact and cost-effectiveness of Golden Rice, Nature Biotechnology 24,1200-1201,2006)

The Luddites have made the introduction of transgenic food crops more difficult -- yet they then use the lack of more production of transgenic food crops as an argument against them. Thus far, we have not held the activists accountable for the huge cost in human life that is the result of their anti-science, anti-technology campaigns. Let me state categorically that there is no controversy in science over the legitimacy of biotechnology, just as there is no controversy in science over whether evolution is a fact of life on earth.

5) The idiotic antics of the anti-GMO NGOs were turning me less optimistic, but I had been convinced by the steady growth in transgenic agriculture in maize, soybeans, and cotton in both developed and developing countries that we would eventually win on this issue (even with the needless delay resulting in a significant cost in human life). I have been further heartened by the outstanding work being done in China, India, and elsewhere on a variety of other transgenic crops. But the current mania for turning food crops into fuel crops (other than for fuel for the human body) has finally turned me pessimistic for the first time in my adult life.

In principle, I am not against forms of alternative energy including biofuels. Instead of subsidizing ethanol and other biofuels from food crops, governments ought to be funding research into
producing fuel from algae, switch grass or other grasses, or plants like jatroba, which offer the possibility of producing fuel economically and reducing greenhouse gas emissions without adversely affecting food production. The need for rapid advances in controlling greenhouse gas emissions requires a vastly better understanding of both the costs and benefits of alternative biofuel sources.

The anti-transgenic crusades made me concerned as to whether we could continue the progress of the last decades, and the food-to-fuel mania has me now worried that we may in fact even reverse that progress. Previously, we could discuss the future of food production in terms of what was done in the past, seeking to continue and improve upon what was done right, correct what was done wrong, and find new ways of making things even better. Now we have to be concerned about keeping things from getting worse.

6) Need I enumerate, in what is an already prolix statement, the daily news stories (particularly from the BBC World News and the Financial Times of London) about rising food prices, rationing in some countries, restricting food exports in others, and talk of rationing food aid? Global food reserves are at a sixty-year-or-more low, and a serious weather problem in some of the major food-producing areas could further compound already worsening conditions. Every major forecast expects the food condition to worsen significantly this year and of course in the coming years. The likely macroeconomic recessionary conditions that are emerging further complicate our efforts.

7) Food production has always been a concern affecting other problems. Even issues such as AIDS have a food component, with part of the problem being inadequate nutrition. I could go on in much more detail, but simply stated, the global food situation is bad and getting worse. The surge in demand for raw commodities by the BRIC countries (Brazil, Russia, India, and China -- two of which also benefit greatly from the increase in the price of their commodity exports) has been driving the upward movement in commodity prices. The inability of producers to respond to the increase in demand has been partly a function of the dearth of investment in mineral commodity production resulting from the extremely low mineral prices in the 1990s.

Over the long term it is highly likely that there will be increased investment for expanding commodity production in minerals. There would then be a likely concomitant reduction in price. Conversely, the prospects for significantly increasing agriculture production and decreasing the real price of food are not even remotely as favorable. Ironically, one raw commodity experiencing a significant increase in output has been cotton (the price of which was artificially low because of U.S. subsidies) because of the major increases in production in India, China, and elsewhere as a result of the introduction of transgenic cotton. There is a message here, but unfortunately, the NGO propaganda machine has so distorted it that it has not made it to the general public and to policy makers in developed countries.

A Look at Africa's Situation
One of the most critical problems facing Africa and the world as a whole is food security. A crisis situation requires some sort of transformation. Short-term problem-solving and crisis response is often, by necessity, handled with already existing capabilities. But the current food crisis reflects some basic problems that will require both national and global visions.

Infrastructure, including transportation:

The food crisis globally and in Africa is clearly multidimensional. Lack of infrastructure is at the very root of the food problem. Transportation costs have so dramatically raised the price of fertilizer -- sometimes increasing it as much as four to six times, causing many farmers to use far less than they should -- less than 10 kilos per hectare in Africa on average compared for example to India at over 100 kilos per hectare, China at circa 200 kilos per hectare (the average for Asia is about 150 kilos per hectare), and as high as 400 or more kilos per hectare in parts of Europe. This has not only led to incredibly low yields by global standards, it has also resulted in African farmers on average taking more nutrient out of the soil -- in effect mining it -- leading to a deterioration of soil quality and structure and soil's ability to retain nutrient and grow crops in the future.

In many cases, the low level of fertilizer use often makes it pointless to use improved seeds or pesticides and gives the farmer a smaller margin of error in case of adverse climatic conditions such as drought, heavy or ill-timed rain, or pest attack. Even should the farmers find the means to improve their output, the lack of infrastructure can make the cost of getting the surplus to market prohibitively expensive. Under these conditions, adequate micro or other credit can do little to help the farmer's condition. The lack of any agricultural surplus in most parts of Africa reduces the possibility of off-farm employment (either full time or part time for farmers) in rural areas. In many parts of Asia, small farmers will earn half or more of their income from off-farm employment, providing them with money for basic necessities such salt, shoes for children, school fees, and occasionally medicine as needed. Off-farm employment often provides the cash income for farmers to buy the inputs necessary to raise their farm output in order to better feed their families.

Climate and climate change:

Whether human actions are causing climate change is much debated. There is very little disagreement as to whether climate warming is happening, though, whether the cause is from human actions or simply from long-term climatic variations. Most climate models forecast that Africa will be the most adversely impacted continent with drought becoming an increasingly deleterious crop-destroying factor. Given that most of the political leaders in developed countries recognize the human causal factors, there needs to be global action to address the problem in Africa.

However one apportions blame and responsibility, the fact is that there is a critical need for food and other crops that are more drought-tolerant. Like it or not, the most promising work in developing more drought-resistant crops is using transgenics -- i.e., genetically-modified crops. No biotechnology scientist claims that biotechnology is the only way to proceed or that it should get all of the funding, but there is broad agreement in the scientific community -- far more scientific consensus on biotechnology than on global warming -- that bioengineering plants will be an essential component of any plant-breeding strategy. Bioengineering is also producing crops with
larger yields that require less pesticide use, food crops that are more nutritious, and crops that allow for no-tillage agriculture, which saves on fuel, soil loss, biodiversity, and water loss -- factors important for advances in African agriculture.

Biotechnology is also needed to address the emergence of new fungal, bacterial, viral, or pest threats to agriculture such as Ug99 for wheat, striga (also known as witchweed) for maize, and black sigatoka for bananas. Overall, there is a consensus that there needs to be far more resources dedicated to agricultural research at all levels globally, regionally, nationally, and locally. The mantra of "carbon footprint" causing global warming has given rise to Green advocacy of buying food locally (some of the adherents of this view are called "locavores") and the use of the slogan "food miles" to oppose the importation of food from Africa and other areas of the South. In Africa, this puts in jeopardy close to 2 million jobs and threatens one of the few successes in African agriculture.

Energy (in particularly, the cost of petroleum products):

The price of petroleum has worsened all of the existing problems noted above. The high cost of transportation is made even higher by petroleum prices. The most important component of fertilizer use is nitrogen. Nitrogen fertilizer is almost purely energy (beyond the capital and labor costs on the plant producing it). Energy essentially is used to take nitrogen out of the atmosphere (nitrogen is 70% of the earth’s atmosphere) and put it in a form usable by plants. The high price of energy has led to skyrocketing fertilizer costs, which has led to farmers around the world using less of it. This along with the long-term decline in agricultural research has contributed to the slowing of growth in grain output and the soaring price of it sending at least a 100 million more people into hunger and poverty.

The problem has been further compounded by the conversion of food crops -- maize, soy beans and sugar -- into biofuel, further skewing the supply and demand of grain and raising the price. The increased price of grain is leading farmers in many areas to use more fertilizer, which should increase global yields, easing but not ending the high prices. This is of little benefit to many small African farmers for whom access to fertilizer (and credit to buy it) has been and remains limited.

The U.N. and others have proclaimed the end of the era of cheap food. Let us hope this is not so -- but there is going to be a long hard road ahead.

The problem of food security has led to a number of economically better-off countries with limited potential for agricultural advance investing in agriculture in other countries. Libya has been seeking farmland in the Ukraine, the United Arab Emirates are seeking to buy farms in Pakistan, and Japan is seeking preferred access to beef in Africa. China has been active in Africa, seeking access to energy and mineral resources, and it is only a matter of time before China seeks to invest in agriculture in Africa.

In a *New York Times* article "Food Is Gold, So Billions Invested in Farming" [2] (June 21, 2008), it is noted that "Some private investors are starting to make long-term bets that the worlds need for food will increase." This includes private sector investments in African agriculture: "And three institutional investors, including the giant BlackRock fund group in New York, are separately planning to invest hundreds of millions of dollars in agriculture, chiefly farmland, from sub-Saharan
Africa to the English countryside." In addition, "Emergent is raising $450 million to $750 million to invest in farmland in sub-Saharan Africa, where it plans to consolidate small plots into more productive holdings and introduce better equipment. Emergent also plans to provide clinics and schools for local labor."

Africa, with its low yields and low population density, is an obvious choice for other countries seeking food security. This could result in a new form of colonialism and imperialism or it can be organized within a framework of global, regional, and national agreements in which all participants in the process gain from increased food production. In other words, the problems identified above for African agriculture can also be defined as an opportunity for investment in research, infrastructure, and agriculture. No other region of the world presents this type of opportunity.

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