

## WORLD PEAK FOOD PRODUCTION

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By now, most of us have heard of “peak oil”. Few people as yet are using the term “peak food”. If world oil production has peaked and begun the downward decline, what about world food production? Obviously the two are intimately intertwined at this time. Modern food production is highly dependent on fossil fuels for tractors, machinery, fertilizers, pesticides, transportation and so on. As oil availability goes down and prices go up, then agriculture production suffers. This is already happening and is likely to get much worse in the near future. The energy price crunch already has many farmers cutting corners and suffering financially.

I asked myself this peak food question in early July of 2006. After a week of study my preliminary conclusion is that world food production peaked in 2004. I base this on reading current world food statistics and situation summaries by the heads of the UN FAO, and international food organizations. To this I add my own current knowledge of worldwide agriculture and natural resource management.

The biggest players in world food production are the grains. Wheat, rice, corn, barley, rye, oats, millets, and the many so-called “rough grains”.

Grains provide most of the calories and protein that humans consume directly, plus about 35% of grain production is fed to livestock.

Tracking world grain production should give us a pretty good idea when food production peaks. At this point, the all-time high, grain production year was 2004. Production in 2005 dropped due to less favorable conditions in some parts of the world. It will take another globally favorable weather year to beat 2004 and that is if there are no disruptions in fuel. A combination of the negative factors mentioned in this article will also continue to whittle away at food production capacity.

Another important factor is that even though food production has been rising, so has population. The per capita food production peaked when? The good global grain crop in 2004 allowed the world to build up grain stocks after a steady drawdown of carryover stocks. World cereal demand is forecast to surpass supply in 2006 and so there will be a further drawdown in the grain supply. The June 2006 FAO Food Outlook Global Market Analysis says this will “push down stocks to an uncomfortably low level.”

China became the world's biggest grain importer recently, as their production no longer meets demand. Grain prices doubled the last time the world food stocks were drawn down to a 57-day supply.

The US grain crop production is taking a big hit in 2006 from drought. Drought is affecting a large proportion of the US, particularly the southern Great Plains. As I type this article on July 18, 2006, most of the US is in a heat wave and breaking records in many places. The Pacific Northwest is one of coolest spots in the nation at the moment and we got above normal rainfall last winter, so Columbia Basin grain growers are currently planning on above-average yields this year. Good weather conditions in one region and bad weather in another region. Farmers are used to good years and bad years. But if there are too many bad years in a row they go out of business. Subsistence farmers might starve.

According to the first US Crop Progress and Condition Report for 2006, based on conditions as of late March, 31 percent of the wheat crop was rated as very poor or poor compared to just 6 percent with such a low rating at the same time last year.

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“Based on the condition of cereal crops already in the ground and planting intentions for those to be sown later this year, and assuming normal weather for the remainder of the season. FAO's first forecast for world cereal production in 2006 points to a decrease of about 19 million tonnes, to 2,015 million tonnes. However, even at this lower level, world cereal output in 2006 would be the third highest on record and above the five-year average.”

#### Hunger Hotspots

Every year, a number of countries face serious food emergencies requiring international food assistance. The causes of these food shortages are varied and complex. In July 2003, 36 countries qualified. See <http://www.fao.org/docrep/006/j0083e/j0083e03.htm>

In southern Africa, food production has started to recover from the severe drought that reduced harvests by as much as 50 percent in 2001/2002. But several countries in the region still face severe shortages and all must contend with the long-term impact of the HIV/ AIDS pandemic,

Although drought and other natural disasters remain the most common causes of food emergencies, an increasing proportion are now human-induced. In several countries in Central and West Africa, civil strife has disrupted both food production and access to food.

Even developments in international commodity markets can trigger food crises in countries that depend heavily on agricultural exports or food imports. The collapse of coffee prices has been a major cause of increased food insecurity in Central America.

Overall, conflict and economic problems were cited as the main cause of more than 35 percent of food emergencies during 1992-2003

According to the FAO, the world has a total of 13,048 billion hectares of land (a hectare is about two and a half acres.) Of this, 1,467 billion hectares are being used to grow crops, or 11%.

There are many reasons I expect food production to decline. Following are some of the major factors. There are many others.

A) The decreasing availability and the increasing costs of fuel, fertilizers, and other industrial inputs.

Probably the #1 problem facing agriculture. How slow or how fast oil decline happens depends on volatile global politics. It could slow gradually. There is however the chance of major damage to oil infrastructure in the Middle East due to wars or insurrections. In which case the ball game will change more rapidly.

B) Wars and low level conflicts.

Wars, insurrections, genocide, oppression and other civil disturbances usually adversely affect farmers. Farmers are killed, displaced, looted, taxed, etc. War is hell for farmers. Increasing instability in many parts of the world hinders the growing of food.

C) Climate change.

Climate change is complex. Climate change leads to more extreme and erratic weather. Farmers are used to growing their crops in a certain window of climate stability. Weather extremes usually mean lower crop yields. More freezes, less freezes, more bugs, bigger storms, droughts, floods, etc all hamper the farmer. Yield reductions and crop losses are going up as the weather changes. This is happening world-wide. Lester R. Brown reports that scientists have recently figured out that for every 1 degrees C. that world temperature goes up there is a 10% drop in world grain yields. This exact figure can be questioned but it indicates that rising global temperature is reducing crop yields.

In 2005 the Amazon suffered an unprecedented drought and many of its rivers dried up. It was the worst drought in more than a century and prompted Brazil to declare a state of emergency across the entire region. And now in 2006 it may be happening for the 2nd year in a row. Already the vegetation is so dry there is a serious danger of forest fires. The Amazon has already lost 17% of its forest cover. This is affecting rainfall patterns. Story on-line in The Guardian. Paul Brown in Manaus, July 17, 2006.

On a local level, a storm with lots of big hail struck crops in eastern Washington on July 5-6, 2006. Old-time farmers say they've never seen a more severe hailstorm. Damages are over 50 million in Okanogan and Chelan counties alone, mainly for damage to fruit. Combined with the damages from two other recent spring storms, there are over \$100 million in losses and the growers are petitioning the federal government for disaster relief.

D) Reductions in soil carbon and soil life.

The "Green Revolution" greatly increased food production. But for a time and for a price. The price was often at the expense of the health of the land. Chemical fertilizers increase yields for awhile, but the health of the soil biota suffers.

E) Soil erosion.

F) Salting of soils. Salinization.

"An estimated 7 to 10 percent of the world's 270 million hectares of irrigated land have been degraded by the accumulation of salts." FAO Counting the hungry.

<http://www.fao.org/docrep/006/j0083e/j0083e03.htm>

G) Drawdown and depletion of aquifers for irrigation.

This is also called mining of fossil water. This is a large and growing problem with millions of acres abandoned already. Lester R. Brown has written extensively on this problem and its scope.

"In many areas, water is being pumped out of the ground for irrigation far faster than it can be replenished by rainwater percolating through the soil. In China, where more than half of the irrigated lands rely on tubewells, water tables have fallen by up to 50 metres over the past 30 years." FAO Counting the hungry.

<http://www.fao.org/docrep/006/j0083e/j0083e03.htm>

H) Poor grazing practices.

Half of the world's land is used for grazing livestock. Much of this land is overgrazed and deteriorating.

I) Land degradation, desertification, depletion of nutrients. abandonment of land.

Every year, millions of acres of land are abandoned because of salting, erosion and depletion of soil nutrients. There are hundreds of books on these topics. The solutions are known and yet it continues at a rapid pace.

J) Reduction in crop genetic diversity and in wild genetic diversity.

Biotechnology has not delivered on its promises to increase production and is likely to be counter-productive in the long run.

K) Conversion of cropland to urbanization, development, roads, etc.

L) Animal diseases are on the increase.

Most recently Avian flu has led to many millions of chickens and domestic fowl being killed either by the disease or by control measures. Mad cow disease, Brucellosis, hoof and mouth disease have all led to many livestock being killed during control measures. Part of the problem is the recent growth in large-scale, livestock facilities leads to disease. The consequent use of antibiotics breeds antibiotic-resistant disease strains. Small-scale production with healthy animals will be affected to some degree, but the large-scale producers are likely to be affected increasingly.

M) Lack of skilled farm labor.

This is more of a problem in the developed countries. Here I focus on the United States. In 2006, some of Oregon's cherry crop will not get picked because of lack of pickers. It will rot on the tree. And the Capital Press just reported that part of Florida's orange harvest won't get picked for lack of pickers in Florida this year. The current crackdown

on immigrants is affecting the US farm production in 2006. Will this continue? Besides this immediate issue of immigrant farm labor, there is a steady decline in the percentage of US citizens who have the physical fitness, the intelligence, the skills, and the desire to do farm labor. There may be vast armies of unemployed but most of them would be of little use on a farm. The intelligent ones can be trained and gradually learn the skills, but this will require an investment. There are few farmworker training systems in the US. At the moment this is an issue that constrains agricultural production in the US.

N) Competition for crops and cropland to make bio-fuels.

The use of grain for fuel (ethanol or vegetable oil bio-diesel) has been rising rapidly. This means less food produced. The net energy gain is questionable and in some cases it is a net energy loss. Large amounts of rainforest in Indonesia and Malaysia are now being destroyed for palm oil plantations for biodiesel. This is a suicidal source of fuel.

O) Pests and diseases.

The amount of crops and livestock lost each year to pests and diseases is enormous in spite of the huge expenditure of pesticides. Pesticides lead to pesticide-resistant bugs. Abnormal weather is causing normal pest/predator relationships/timings to fail. Weather stressed crops are also more susceptible to insects or diseases.

P) Collapsing fisheries

Fisheries are collapsing for many species in many parts of the world. The result of overfishing, and climate change.

Q) Retreating glaciers

Climate change heating reduces glaciers in many parts of the world which are the supply of warm-season, irrigation water. These reductions are already affecting millions of people.

R) Rising seas.

Rising seas flood farmland. Bigger storm surges inundate coastal farmland.

S) Honeybees and pollination of crops.

Honeybees are essential for pollination of many crops, notably fruits and vegetables. The introduction of the varroa mite and tracheal mite to the US has made life much more difficult for honeybees and beekeepers in the US. Most wild hives have died. More medication has to be applied to the hives. There are big losses of hives. I just read an article on the importance of honeybees to crop production in the July 2006 issue of *The Orchardist*, which is New Zealand's main fruit industry magazine. The varroa mite had just jumped from the North Island to the South Island. It had recently spread through the North Island killing many domestic hives and all the wild feral honeybees. They were worried about European Foulbrood showing up. They already were dealing with American Foulbrood. The article reported that 40-60% of the US hives had died in 2005. "As a result American growers had to import hives from Australia to pollinate their almond crops". The article also reported that the mites were developing resistance to the antibiotics being used in the US. Having skilled beekeepers that can keep hives alive is

essential to most fruit and vegetable production as well as the honey crop itself. This is another problem facing food production in many places. When was the last time you saw this mentioned in the news?

T) Declining mineral and vitamin content in food.

It is a well-known fact that food produced in the US has much lower amounts of minerals and vitamins (and flavor) than it used to. So it is important to remember that it is not only quantity of food that counts, but quality. Healthy foods lead to healthy bodies and healthy minds. This decline in nutrients in crops also affects livestock production.

The particular mix of problems affecting a farming region will vary. Rising oil prices and climate change are the two factors affecting almost every region.

All these continue at the same time as human population continues to build. It doesn't take a crystal ball to see big trouble ahead. Already a large % of the world's poorest are starving or suffering from malnutrition. For the most part, the world's affluent people don't seem to give a damn. But as things proceed, their safety will increasingly be threatened. Will people starve to death quietly, or will they kick up a fuss?

Small-scale subsistence agriculture in the developing world is less dependent on fossil fuel than industrial as it still relies largely on human and animal. However, those systems are still subject to all the other problems mentioned in this article.

There is the possibility that humanity will rise to the challenge and switch to sustainable agriculture. I believe that sustainable agriculture can outperform current farming systems. This turnaround however would take time even in the best of scenarios. Within any farming region there are good examples and bad examples. Even under the best of scenarios, overall production is likely to fall for some time before stabilizing.

There are solutions

I have spent the last 34 years researching solutions to the problems outlined in this article and would like to share some of them with you.

I believe that we could feed all the current world's population a nutritious diet on half of the land we currently use and do so on a sustainable basis. To do so, many more people would have to be involved in food growing and we would have to use the best sustainable techniques available and a mix of crops, techniques and strategies appropriate to each climate and culture. There is no blanket formula. Each farm and farmer are unique and need to be treated as such.

Some of the main ecological agriculture systems include:

Low-external Input and Sustainable Agriculture (LEISA)

Organic agriculture.

Permaculture.

Bio-Dynamic agriculture.

Traditional systems.

Bio-intensive gardening.

Agroforestry.

Analog forestry.

Keyline system of soil and water management.

Soil conservation.

Home gardening.

Wild gardens.