



## Peak Oil And World Food Supplies

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Only about 10 percent of the world's land surface is arable, whereas the other 90 percent is just rock, sand, or swamp, which can never be made to produce crops, whether we use "high" or "low" technology or something in the middle. In an age with diminishing supplies of oil and other fossil fuels, this 10:90 ratio may be creating two gigantic problems that have been largely ignored.

The first is that humans are not living only on that 10 percent of arable land, they are living everywhere, while trucks, trains, ships, and airplanes bring the food to where those people are living. What will happen when the vehicles are no longer operating? Will everyone move into those "10 percent" lands where the crops can be grown?

The other problem with the 10:90 ratio is that with "low technology," i.e. technology that does not use petroleum or other fossil fuels, crop yields diminish considerably. As David Pimentel showed in 1984 in his "Food and Energy Resources," with non-mechanized agriculture, corn (maize) production is only about 2,000 kilograms per hectare, about a third of the yield that a farmer would get with modern machinery and chemical fertilizer. If that is the case, then not only will 100 percent of the people be living on 10 percent of the land, but there will be less food available for that 100 percent.

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Incidentally, my use of Pimentel's study of corn is mainly due to the fact that, although his analysis is only a small and limited one, it provides a handy baseline for other studies of population and food supply. In general, a vegetarian diet requires far less of the world's resources than a carnivorous one, although I have my doubts about the dietary wisdom of avoiding meat entirely. More specifically, corn is one of the most useful grains for supporting human life; the native people of the Americas lived on it for thousands of years. Corn is high-yielding and needs little in the way of equipment, and the more ancient varieties are largely trouble-free in terms of diseases, pests, and soil depletion. If it can't be done with corn, it can't be done with anything.

Actually, of course, there is a third problem that arises from the first two. This is the fact that if 100 percent of the people are living on 10 percent of the land, then the land may have so many people, roads, and buildings on it that a good deal of that land will be unavailable for farming. This problem of disappearing farmland is certainly not a new one; for centuries it seemed only common sense to build our cities in the midst of our paradises.

Let us play with some of these numbers and see what happens. These are only rough figures, admittedly, but greater accuracy is impossible because of the question of how one defines one's

terms, and even more by the fact that everything on this poor planet is rapidly changing. The present population of the Earth is about 7 billion, but there is no point in being more specific, since the number is increasing daily. Nevertheless, 7 billion should be a large enough number to make us seriously consider the consequences. (What other large mammal can be found in such numbers?) When I was born, in 1949, there were less than 3 billion, and it amazes me that this jump is rarely regarded as significant. These 7 billion people in turn live on only about 29 percent of the surface of the Earth, i.e. on dry land, which is about 148 million square kilometers.

Of that 148 million square kilometers, the arable portion, as I said, is only about 10 percent, or 15 million square kilometers. If we divide that 15 million square kilometers into the present figure for human population, we arrive at a ratio of about 470 people per square kilometer of arable land.

Is that last ratio a matter for concern? I would think so. A hard-working (i.e. farming) adult burns about 2 million kilocalories (“calories”) per year. The food energy from Pimentel’s hectare of corn is about 7 million kilocalories. Under primitive conditions, then, 1 hectare of corn would support only 3 or 4 people — or, in other words, 1 square kilometer would support 300 or 400 people. And all of these are ideal numbers; we are assuming that all resources are distributed rationally and equitably. (We are also assuming no increase in population, but famine and the attendant decrease in fertility will take care of that matter very soon.) Even if every inch of our planet’s “arable portion” were devoted to the raising of corn or other useful crops, we would have trouble squeezing in those 470 people mentioned in the previous paragraph.

Given such figures, I have little patience with writers who sprinkle the words “alternative,” “sustainable,” and “transition” over every page. Simple arithmetic is all that is needed to show that such a lexicon is unsuitable.

Nor can I do anything but shake my head when my “organic gardener” friends tell me that they can grow unlimited amounts of food merely by the liberal application of cow manure. Eliot Coleman, Andrew W. Lee, and other recent writers on “low-tech” agriculture (not to mention any farmers of the old school) agree that if cow manure is used on a hectare of farmland, for the first year of crop production at least 100 metric tons are necessary, and after that about 20 tons per year might be adequate. However, cows take up land. Another older but valuable book is Frances Moore Lappe’s “Diet for a Small Planet,” in which she points out that one cow requires over a hectare in pasturage; that is in addition to the hay, grain, and other foods that the animal is given.

How many cows are needed for all that manure? I neither know nor care. All that is certain is that the use of cows to keep a garden in production would multiply the necessary land area enormously. There would also be no mechanized equipment to deliver the manure. The knowledge of animal husbandry, under primitive conditions, could certainly not be learned overnight. But I can say from experience that reality hits when the sun is going down and the shovel is getting heavy.

Many of the false figures that appear in discussions of the future are the result of armchair gardening of the worst sort. Growing a tiny patch of lettuce and tomatoes is not subsistence gardening. To support human life one must be growing grains and similar crops high in carbohydrates and protein, and these foods must be in quantities large enough to supply three full meals a day, every day, for every person in the household. We must also consider that in apocalyptic times it will certainly not be possible to stroll over to the tap and use a hose to pour unlimited amounts of water over one’s plants; on a large garden, the water is whatever the sky decides to send.

There may be an odd solution or two. There are parts of the Earth where population is actually decreasing in absolute numbers, as people mistakenly come to believe that country living is too hard. Well, yes, being squeezed out by multinationals is definitely too hard, but I'm talking about subsistence agriculture, not trying to survive by picking beans for a dollar an hour. Another partial solution may be a return to foraging, especially for those who choose to live in that non-arable 90 percent. Hunting and fishing have become unfashionable hobbies, but for the physically fit these skills could be a lifesaver; over-harvesting is certainly a concern, but the great majority of westerners are far too weak to spend a day plowing through underbrush.

The seacoast has possibilities that intrigue me. In various coastal areas it is traditional to grow potatoes by placing them on bare rock and covering them with seaweed. Even without a boat it is possible to get a meal by gathering shellfish.

Nor should we totally discount the practicality of animal husbandry. There are many parts of the world that are not suitable for agriculture, but the same land might produce wild grasses or other vegetation that in turn could feed domesticated animals. Under primitive conditions the density of human population in such areas would have to be very low, and the danger of over-grazing would always be there, but the truth is that there are large parts of the world that supported a pastoral life for centuries.

I don't have much patience with cobbled-together happy endings, but I think there are answers for those who are single-minded enough to go after them. Remember that you can't save the whole human race, you can only save a few people; learn to use a gun and an ax; head for the country. Oh, yes, and get yourself a reputation as a good neighbor; they may not actually adopt you, but they might help you out when there's trouble.

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