

Worrying About The Carrying Capacity

The Third Millennium began about 10 hours after I arrived in San Francisco. These two events are unrelated, I know. But I thought I would mention that anyway.

My boss in New York had made me an offer I couldn't refuse. He wanted me to move to San Francisco very badly, I think on the assumption that only this city's culture could possibly tolerate me. He certainly was convinced that our fellow partners in New York had had more than enough of my dropping Platonic observations into random conversations on elevators.

Or maybe it was my jokes.

I had barely survived, before making partner, one such elevator joke. I had just met Douglas, a corporate partner who hailed from Texas and had a mustache to match, in a meeting for a new deal I had been assigned to. I had not worked with him before, but I had heard that he often bragged about his new trophy wife, a French judge who lived in Paris.

After the meeting was over, I got on the elevator at the same time Douglas did. As the doors closed on just the two of us, it was clear he was going to continue to ignore my existence, as he had at the meeting. So I started an elevator conversation. "I look forward to working with you on our deal," I said. His silence and lack of eye contact continued.

"It should be fun, because we have something in common," I added. That got his attention. He looked at me with great disdain and wondered out loud, "What could *we* possibly have in common?"

"Well, we both have European wives and a transatlantic commute to keep in touch with them," I answered cheerfully.

"Oh," he sneered, "I am sure my situation is completely different than yours."

Just then the elevator doors opened for me to get off. I started to step out, but could not resist adding over my shoulder as I left, "I apologize for my presumption. You are correct. We have nothing in common at all. You fly to Paris to see your wife. But my wife flies to New York to see me."

Unfortunately for the history of the human race, almost all of us have this intriguing desire to feel more important than everyone else. About six months after I arrived in

San Francisco I met a young woman, with an interesting version of that desire, at a Sierra Club conference I wandered into. We were only chatting for a few minutes before she whispered conspiratorially, “you know, the Earth can really only handle about one billion human beings.” “Really? Only one billion?” I asked.

“Maybe not even that many,” she insisted. “Wow,” I said. “So — have you thought about how we get from here to there? Because a few leaders tried to move us in that direction during the 20th Century, and in spite of their determined and persistent efforts they were only able to eliminate about 100 million of us. You know — Mao, Stalin, Hitler. And they aren’t that popular. So what’s your plan?”

At that point she must have suspected I was not a true believer, because our conversation came to an abrupt end.

Of course, that young woman is not alone in thinking that the Earth has run out of resources, that its carrying capacity is clearly overloaded. Malthus is famous for his conclusion in the early 19th Century that population growth will always tend to outrun the food supply. But think about it. How can the population grow if there isn’t enough food? Isn’t it actually impossible for the population to be larger than the food supply can manage to feed?

Now, we definitely do have a food supply problem, and even more so a food distribution problem, that humanity must regularly deal with as our population expands. But not once in the known history of the human race has the population exceeded — for more than a few days anyway — the available supply of food.

Right after World War II the general sentiment was quite different. After a long economic Depression and then a very destructive war, many young adults were keen on repopulating the planet. My parents were among them. One of my six brothers once accused our parents of attempting to single-handedly replace all those war losses. Our five sisters agreed immediately.

But times changed in the wake of the Baby Boom. They certainly had by late 1971, when three older siblings and I had already left home. In December our mother went food shopping with the five youngest in tow. At that time they were about 12, 10, 8, 7 and 3. And she was accosted at Kroger’s by a young female environmentalist who shouted at her for ruining the planet by overpopulating it.

My mother always smiled when she told this story. Because she always ended it by saying, “I can’t imagine what she would have said if she had known I also had three teenagers at home, plus four more already out the door.” And that is not even taking into account the rest of our extended family, which includes 95 first cousins, just for starters. Perhaps our family was part of an unconscious cultural attempt to prove to the Brits that they were utterly too restrained at home for their own good. But whatever the real cause, postwar Irish-German Catholic alliances proved very productive.

So these are our two extreme choices: depopulate the planet immediately or repopulate it as quickly as is possible for Irish-German Catholics — with a little help from Mormons thrown in.

I suggest we aim for the rational middle ground. To get there, let's first look at some historical trends for dealing with overpopulation, and then look at the facts about the Earth's carrying capacity.

There has only been one large-scale attempt to directly limit population growth that we know of, and that was in China, started under Deng Xiaoping in 1979. Their one-child policy certainly worked to limit population growth, but it created serious problems that are sinking in now: the cultural bias for male children which has skewed their population away from a 50% female - 50% male ratio, and the high percentage of elderly people in their society, among others. Of course, pre-history may shroud similarly large-scale attempts in the past, but history does record many small-scale problems caused by overpopulation in one part or another of the planet.

One of those problems is war. Another, with the growth of urban populations prior to anyone figuring out how important sanitation and personal hygiene are, is fatal epidemics. Both war and epidemics do help decrease humanity's carbon footprint on our planet, but those kinds of solutions are clearly "cures worse than the disease", so we really don't have to bother experimenting any further with them, popular though they have been.

Surprisingly, over time the human race has actually developed increasingly humane ways of dealing with overpopulation. Early wars between nearby communities often resulted in the total annihilation of the losers. Then a relatively humane innovator invented slavery, and our economies began to improve.

Centuries later, local overpopulation problems began to be solved by creating colonies of the overpopulated culture in other, far less populated locations. Plato considers this a good response to local overpopulation in *The Republic*, and two thousand years later Thomas More mentions the same solution in *Utopia*. When Plato was alive, successful Greek city-state cultures were spreading their societies throughout the Mediterranean area. And when Thomas More was alive, the colonization of the Americas seemed to be a better solution for reducing the European population than religious wars.

So when I say relatively humane, I mean — relatively. Slavery is just barely better than annihilation. And colonization worked best when using almost unpopulated lands. But there is no such thing on our planet anymore. Depopulating another culture so that you can repopulate your own culture on their former lands is certainly a time-honored method of cultural hegemony. But only time honors it. The rest of us have more difficulty with this approach. At least recently.

All the way to the end of the 19th Century it was still rather widely admired for many reasons. Unfortunately for the Japanese, their late-to-the-game imitation of European and American colonization efforts extended into the 1930s, and by then many people were beginning to have doubts.

Now that colonization has lost its social acceptance, less-organized and less-overwhelming migration flows are taking its place. This is again relatively humane, when compared to colonization, but it still evokes primal fears.

So perhaps it would be wise to step back, study demographic trends, and realize (at least throughout the Southwest) that the migrants coming from Central America are part of the same process that led to the Mexican-American War. It is northern European migration into North America, a few centuries after southern European migration into Central and South America, that lies at the base of these trends.

If we step back even a little further, we can also see that Asian migration to the west coast of the Americas is just a continuation of earlier migrations — after a 15,000 year hiatus.

Perhaps the best way to understand all these migration flows is to first study fluid dynamics. Unfortunately, we still don't understand fluid dynamics all that well.

But if we take an orbiting satellite's point of view of human demographics, I think we can at least conclude that the future belongs to human cultures which can support the most people per square mile. The clear current winners using that metric are seemingly chaotic, older Asian cities and their newer, more organized counterparts.

I lived in Hong Kong from 1974 to 1976, and the chaos (outside the business districts) was seemingly unsustainable. 4.5 million people lived there then, in 20-story apartment buildings as far as the eye could see. And if you ever flew into the old Hong Kong airport back then, you will remember distinctly that the plane's wings nearly clipped the laundry lines on the tops of dozens of apartment buildings as it flew over them in its descent towards the urban runway.

Forty years ago it seemed impossible to me that more people could ever be packed into Hong Kong. But now the population is 7.5 million, nearly double what it was when I lived there. And I must say, it seems less chaotic now than it did then. A lot of that increase in organization is probably due to the great increase in wealth that Hong Kong has experienced as it has grown.

So there is room for some optimism, as long as our wealth continues to increase more rapidly than our population growth. Given our increasing rate of technological progress, that is not a vain hope.

For many, though, our scientific progress inspires fear, not hope, because it might allow increasing population growth at unsustainable speeds, leading to an Armageddon, or at least to a serious meltdown.

To answer that fear directly, let's look at the actual carrying capacity of the Earth. Let's see as clearly as we can what the scale of our problem actually is.

To do so, we again have to step back away from our human perspective and use that satellite-eye point of view to take a look at life on our planet — made up, as it is, of many different species. We of course make the assumption that we humans are Number One on this planet. That we have the most profound impact on our shared environment. That we are the important ones.

But one fairly objective way to measure the relative importance of different species is to determine what percentage of the overall biomass on Earth each species has. Such measurements are, of course, imprecise. But let's go with the best guesstimates currently available. Their imprecision is good enough.

Plants are far and away Number One. They are thought to embody about 80 percent of all the carbon stored in living creatures. Bacteria come in second, at about 13 percent. And fungi are third at 2 percent.

All 7.6 billion of us account for just one ten-thousandth of the biomass on Earth. One ten-thousandth. We are clearly not even close to being competitive with bacteria and fungi.

I have an easy, personal way of understanding the meaning of one ten-thousandth. I worked as a mergers and acquisitions attorney for over two decades. During that time I worked on over 200 deals, worth over \$40 billion dollars in the aggregate. My total personal income during those decades was almost exactly one ten-thousandth of the value of the deals I negotiated. And that was gross income, before our various branches of government took their one-third.

So I see lots of room for growth between my personal income and the \$40 billion in value I negotiated, and I see lots of room for growth for the human race too.

Perhaps I am too speciesist, but I really would not feel terrible if the human race made serious inroads on the share of the biomass that fungi currently, and quite selfishly I might add, account for. If the human race expanded just enough to take over a little more than half the share of the biomass that fungi currently keep to themselves, and so move the human race into third place in the biomass competition, the human population on this planet would be almost 100 trillion.

I did say 100 trillion. And even at that point we would only slightly exceed one percent of the biomass, having crushed fungi down to less than one percent, and into fourth place.

Unfortunately, that is about all we can hope for in the biomass competition. Because there is a severe logistical problem with trying to move into second place by passing up bacteria at 13 percent, since our own bodies depend on bacteria. Various estimates assume that between 2% and 8% of our own biomass is actually bacteria.

Those estimates made me wonder whether the scientists who guesstimated the relative biomass distribution among species took this into account. Or if they double-counted because they forgot to deduct about 5% from the human biomass total and reassign it to bacteria.

It also made me wonder whether the entire human race isn't just an experiment by some sub-species of bacteria — who seem to be always on the lookout for an interesting carrier. Perhaps, I thought, those bacteria subspecies had long ago been assigned the task of visiting other planets, and have been working on us ever since to make that happen.

But then I realized that the 5% of our human biomass that is actually bacteria is only about four ten-millionths of all bacteria on this planet. How embarrassing! As far as the rest of the bacteria are concerned, they don't even amount to a rounding error. So no important project could possibly have been assigned to such insignificant subspecies.

That makes me think we need to be modest, and stick to the goal of third place, and move in on the fungi. Of course, the takeover will have to be very gradual, over many, many millennia, and, like the last 20 millennia, various other species would probably take a serious hit, especially big mammals we don't eat, or like to have around to entertain us. It is already estimated that domesticated mammals outweigh wild mammals 14 to 1, and that chickens alone outweigh wild birds by 3 to 1.

It is also safe to assume that more and more plants, which make up 80% of the biomass, will be converted to food sources for humanity. The Earth and its resources have already been gradually adjusting to human desires over the last few millennia, and that is highly likely to continue at an ever-increasing pace — whether the human population increases further or not.

Such transformations of the Earth's biomass will require a great deal of intelligence and organizational skill. But the last five millennia make it clear we do have the skills required to make the Earth more accommodating to human desire. That is, at least 25% of our population has those skills or could acquire them, and that is enough. The possession of those skills is also more than can be said for any other mammalian species. Most of us like cats and dogs, but managing the transformation of about 5% of the biomass on this planet over the next million years is not likely to be engaged in by them, or by orangutans, or by dolphins, or by anyone else — only by a few million enterprising and perhaps foolishly optimistic humans.

Now, if we actually take on this project of becoming Number Three in the biomass competition, I have one suggestion. Put the Irish-German Catholics in charge. They'll do a bang-up job, and get us there much faster than you would think possible.

Of course, my point here is not to encourage the growth of the human race to 100 trillion. It is just to make clear that the Earth's carrying capacity for human life is not the real issue. That concern is just a fear-inducing illusion. The real issue is whether we, as a human culture, are going to engage our already developed skills to make human life on this planet more enjoyable — whether we are going to move the other half of our race out of survival mode and into enough physical comfort and decent health that they can also enjoy contributing to our rapid accumulation of knowledge.

This fear-inducing illusion that the Earth simply cannot handle any more human beings, which is scientifically inaccurate, has the horrible side effect of making many feel that it is not wise to bring those last billions up to at least lower middle class standards of human life. Because they fear, if we do that, that those people will just keep producing more children, and live longer lives. So this illusion that the Earth just can't handle any more humans gives us permission to ignore the fact that we could, with just a three-decade push, make clean water and decent food available to almost every human being on the planet.

This fearful illusion is a lot like the fear that induces people to jump out their windows, to their deaths, when an earthquake hits. What are they afraid of? Dying during an earthquake. What do their actions lead to? The certainty of dying during an earthquake — rather than just a slight risk of that outcome.

Obviously, some people go a long way in order to be certain. And those who think we have absolutely no room on this planet even for the human beings who are already here can easily be convinced to do equally foolish, and self-destructive, things.

By making this point about the Earth's actual carrying capacity, I am not denying we are causing global climate change. It is quite safe to assume that the doubters are incorrect, that global warming is occurring, and that it is, to some extent, unstoppable. But it is also important not to jump off the planet just yet.

We really do not have enough information to conclude that humanity will not be able to adjust to higher temperatures. What information we do have, from ice core studies of the last 4,500 years, is that there have been dozens of major swings in global temperature, ranging from an average global temperature low of 54 degrees Fahrenheit in 1600 A.D. to an average global temperature high of about 60 degrees Fahrenheit in 1100 B.C. The current average is just over 58.5 degrees Fahrenheit.

It is hard to find clear patterns in this data, but the most obvious one is that, if solar radiation decreases at the same time that volcanic activity increases, there is a fairly quick drop in the average global temperature. Both the amount of solar radiation and the

severity of volcanic eruptions are, of course, outside our ability to control. But even that lack of control does not mean we should give up and ignore the evidence that our spewing of carbon dioxide into the atmosphere has noticeable effects.

Similarly, just because it is futile for us to attempt to toilet-train the 13% of the Earth's biomass that is bacteria, that does not mean that our goals of creating cleaner air and cleaner water through sanitation and other environmentally-sound efforts, which we have only relatively recently begun to engage in, are also futile.

It does mean, though, that we should pause long enough in our fears to realize that abruptly stopping the use of fossil fuel energy by human civilizations will not save us. Because it can be safely predicted that that would — in and of itself — seriously disrupt human life, with casualties probably in the billions.

It does seem prudent, though, to gradually minimize our effects on global climate change, always keeping in mind that the cure not be worse than the disease. At least until we know, in a century or two, how well we are reacting to higher temperatures. Because we also know that higher temperatures, up to a point, mean more biomass, more carrying capacity, for the Earth.

The Earth is thought to have been much warmer 600 to 800 million years ago, and it is fairly certain that approximately 56 million years ago the average global temperature was as high as 73 degrees Fahrenheit — 15 degrees higher than our current global average. The exceedingly lush plant life back then reminds many of one thing: dinosaurs. That is why the prediction of much higher global temperatures scares some people into thinking that dinosaurs will make a comeback. Not to worry. We have powerful guns now, so we can eat them too.

But this alluring image of maybe being able to eat dinosaurs in the future should not induce us to mess with climate change. It is not possible for us to completely eliminate our effects on climate unless we cease to exist. But it is possible, and probably safest for all concerned, to minimize our effects whenever we notice we are causing problems, as we did recently when the ozone layer was thinning.

There are, of course, many ways to downsize our carbon footprint. I wonder sometimes whether an ancient human civilization had to face environmental issues similar to those which rightfully concern us. I imagine, if they did, that their solution could have been radical downsizing. Perhaps at first only humans under five and half feet tall were allowed to reproduce. Within a century, only those under five feet tall. And so on — until they became insects.

This thought makes me optimistic for our future, because we all know — all too well — that the Earth can nourish and sustain quadrillions of insects.