The Age of Migrations

Intersecting population trends

by Lindsey Grant

The terrorist attacks last September remind us that it is an uncertain world, here at the start of the twenty-first century. Demographic trends are a fundamental source of the uncertainties. I can hardly pretend to foresee how the trends will play out, but I can describe some of the forces presently in motion.

The Accidental Experiment

To state my thesis at the outset: we are fiddling with the systems that support us. We are generating and exacerbating competitive tensions among the human tribe. And we don't know what we are doing. We have gotten ourselves in this jam because, without thinking through the consequences, we altered the balance between our species and the rest of nature. We have come to believe in Growth as sacrosanct, when in fact human growth at recent rates is a new thing on Earth, and no material growth can be sustained forever on a finite planet. We have moved into a position of dominance, but we don't accept the responsibilities that go with that role. We need to make fundamental changes in our mindset if we are to deal with the forces we have put in motion.

Scientists occasionally characterize various human activities as "unplanned" or "accidental" experiments. We change the biosphere without knowing – or indeed much caring about – the ramifications, and without a companion Earth to serve as a control. It is a good metaphor for what we are doing to the planet.

The vastest of these experiments was begun around 1950. It drives most of the others. We began to apply modern medicine and public health practices to reduce mortality in the poor countries. The motive was humane. We all can applaud a reduction of mortality. But when we tampered with one side of a natural equation without looking at the other side, we generated a fundamental imbalance. Efforts to address human fertility were delayed, timid, and faltering. Consequently, the world's population grew much more in the following two generations than it had in all previous human history.

The less developed, poorer countries nearly trebled from 1.7 billion in 1950 to 4.9 billion in 2000. The United States' population, driven increasingly by immigration, nearly doubled from 151 million to 281 million. The rest of the industrial world grew by just 37 percent, to 910 million.

Concurrently, there was a consumption boom unparalleled in human history. The combination has led to hitherto unknown pressures on resources and productive systems. For the first time, humans now dominate most ecosystems and affect all of them.

A cascade of "experiments" has followed, mostly connected with that first one. We supported the growth of human populations with some fundamental changes in agriculture. We now use six times as much commercial fertilizer as we did in 1950. Human activity puts nitrogen, potassium, phosphates, and sulfates into the environment much faster than natural processes produce them. We don't know what will happen if this goes on for another century or so, but we cannot stop the experiment, because without commercial fertilizers, literally billions of people would starve.

We would have drowned in the nitrogen if it were not being processed back into its inert atmospheric state by some helpful microbes. We don't know much about those microbes, but we are changing their environment and thereby testing how much abuse they can take. If we learn the answer to that unintentional experiment, it will be too late, because our lives depend on them.

Traditional crops have developed defenses against pests through generations of seed selection. The "green revolution" crops provide more food, but they demand more fertilizer and more pesticides. We are introducing

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new pesticides and new plants through genetic modification and thereby inadvertently promoting the evolution of our opponents into more formidable adversaries. The mutant pests can handle the pesticides, so we invent something nastier, in an ongoing and dubious war.

The new crops also require much more water, and irrigation has doubled, but the era of rising irrigation has ended. Now arid regions are running out of water, and scarcities are appearing even in moist areas, including the eastern and central United States. We cannot count on irrigation to sustain growth in yields. It takes a thousand tons of water to grow a ton of corn. The supply of available water is basically static. When the areas with enough rainfall are already in use, when farmers have bought whatever water is available from surplus areas and have mined the aquifers, the price of water skyrockets. With the best available technologies, and with energy prices at present levels, it costs about $2 to $3 to desalinate 1000 gallons of seawater – delivered at the seashore, not the farm. Farmers won't pay $100 or more for the water to raise a bushel of corn that might fetch something like $2.50.

And they won't recycle the water by building huge greenhouses, as some people have suggested. That is possible for specialty crops such as tomatoes for the prosperous in the winter. But as a way of providing basic food for six billion people, and rising, the cost would be out of sight.

Humankind has come a long way from the time when there were very few of us and we could survive by hunting and gathering. As agriculturalists, we are hitting the stops.

Growth advocates then ask, "Why not farm the oceans?" The answer is that we are already over-fishing them. Theoretically, we could raise yields by fertilizing them, as we do the land. In particular, spreading iron in the sea in very small concentrations would probably lead to increased phytoplankton production and larger fish harvests. Experiments have been tried, and it is being seriously proposed that they be extended. This enthusiasm results partly from another calculation. Such fertilization might also sequester atmospheric carbon dioxide and thus mitigate climate warming. Speculative companies have even been created, hoping to make a profit from a potential world market in credits for carbon sequestration. Commerce never sleeps.

The problem here is that the proposal would transform the sea and the climate in ways we cannot predict. It would be another unplanned experiment with the earth, this one on a scale so vast as to make our fertilizer experiment on land seem picayune. The proponents are, in effect, proposing another very dangerous "solution" to two perceived problems, in an effort to avoid the one thing we must do: limit the demand.

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Our energy future also faces limits, driven by rising costs. My corn calculations above were based on present energy prices. The price will rise. Petroleum resources are finite – a circumstance that most people (except our Vice-President) seem to recognize. The U.S. Geological Survey estimates remaining world resources at something over two trillion barrels. World usage presently runs at roughly 68 million barrels a day, and it is rising. Not a very long future. The United States has already pumped out about 70 percent of the petroleum we started with.

Denial is an ingrained human trait. Growth apologists, faced with the experts' estimates, look to some panacea. Oil sands are cited as the next source of energy, but their processing involves horrendous environmental costs, and experience suggests that it may take more energy to exploit most of them than they can produce. Ocean methane from the continental slopes is cited as another possibility, but the environmental consequences of such an effort are even more frightening. We would be more likely to release the methane to warm the climate than to capture it for human use, triggering undersea mudslides and tsunamis as we did so.

When world petroleum production passes its peak

(probably within the next generation), the pressure on prices will be intense. Users will turn increasingly to natural gas, and gas resources will then come under pressure. We can shift to other resources, but nuclear power is dangerous and expensive. Coal is dirty and offers the unpleasant choice of either increasing air pollution and releasing more greenhouse gases, or making heavy investments in clean-up technologies. (It is also very unevenly distributed, worldwide, like petroleum, but in this case the United States has the largest share.) Europe is beginning to diversify its sources. So should we. We can move toward more benign technologies such as wind and photovoltaics. Wind energy is nearly competitive for peaking power, right now, and would probably be cheaper than oil and coal if we figured in the environmental costs of fossil fuels, but wind and solar energy are likely to be much more expensive sources of base power than any conventional source is now.

The point of this thumbnail sketch of energy sources is that the world will have to go through a rapid energy transition even if it avoids the calamity of a sudden interruption of supplies from distant and unstable areas. It will face rising costs that will ripple through the world economies. We will be much better off if there are fewer people, demanding less energy, than if nations must finance the cost of the energy transition on top of the infrastructure costs of accommodating rising populations.

Population and Security

To move on: our gigantic experiment with the climate is population-driven. Consider this: if world populations now were what they had been in the 1950s, our total release of carbon dioxide would be within a tolerable range, even without reforming our current energy-intensive habits.

Human activities have become the principal driver of species extinction and the unwitting architect of evolution.

I could go on and discuss chemicals. Or sewage and solid waste. But enough is enough. We must come to recognize the immense role we have assumed on Earth. We can no longer behave like other animals, oblivious to the consequences of our activities. We have learned to change the earth but not to manage it. We cannot put the genie back into the bottle. We must learn to control it. And that starts with reducing our own demands on the system.

Since we are preoccupied with terrorism and its sources right now, let me describe its demographic origins. How can people become so angry they will destroy themselves to destroy others? Most people tend to be friendly when they are not threatened. Tensions grow and hostilities mount when they are competing for scarce goods and resources. The Middle East is mostly desert, with few natural resources except petroleum and gas. By and large, the populations in 1950 were living at subsistence level within those constraints. The oil boom and the population boom changed all that. Since then, Saudi Arabia has gone from three to 22 million people, the United Arab Emirates from 70,000 to 2.6 million (most of them foreigners). Jordan, without oil resources, has five million inhabitants now; it had fewer than 500,000 then. Most of the countries in the region have trebled – even Afghanistan, which is in shambles.

Israel, at the middle of the powder keg, has gone from 1.3 to six million, fifteen percent of them Arab – and this does not include the Palestinians in the West Bank and the Gaza Strip. The Jews are sequestering water supplies for their own use at the expense of the Palestinians, but the Palestinian West Bank is the source of the aquifers on which Israel depends. The million-plus Arabs squeezed into the Gaza Strip are doubling every eighteen years. With aquifers turning saline, with few jobs and almost no resources, young Arabs there are probably at a stage of anger we can hardly imagine.

Add others to the mix, such as the jobless college graduates in Egypt or Saudis with declining incomes. It is hard enough to be poor. It is intolerable to be poor and see immense wealth around and above you, to have no job or any sense of purpose other than that provided by fundamentalist destroyers such as bin Laden.

The minuscule supply of water in that region has not increased, so per capita supplies are declining accordingly. The oil rich can desalinate seawater for domestic and commercial use, at a very high price – but not for irrigation. The poor do not have that luxury. As competition for water intensifies, so do the international tensions. Water is a major issue in Israel's relations with Syria and Jordan. The Turks have been putting dams on the Tigris and the Euphrates, threatening Syrian supplies and Iraq's irrigation systems.

The Arab world is the slowest of all regions, except Africa, in adopting family planning. That means that the poverty, the inequities, and the shortage of water are going to become even more galling. Most poor countries

would welcome more help from us in bringing human fertility under control, but probably not those in the Middle East. They are locked into their antagonisms, and family planning is a victim of competitive breeding.

We can see trouble brewing ahead for all of us, and particularly in that volatile region. I assume that even an anti-Western (anti-American) fanatic would want to sell oil to us, because his followers would need food and necessities. The more immediate danger for the Western world and Japan is that turmoil would interrupt the oil supplies on which we depend. During Desert Storm, the Iraqi Army managed to torch the oil wells in its path even when it was in full retreat. Our dependence increases year by year. Japan, with almost no indigenous energy sources, is the most immediately vulnerable, but a significant interruption of oil from the Persian Gulf area would create economic pandemonium worldwide.

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That is a contingency, not a prediction. Usually, we cannot predict the specific outcomes of our experiments with much confidence. The interactions are too complex. Population change, however, has considerable momentum, like a great ocean tanker. We can identify some of the other issues it will generate during the next half century.

The Age of Migrations

Three very different demographic trends are intersecting in the world today. The poor countries are going one way, most of the industrial world is going another, and the United States seems to be caught in the middle. I will address the first two trends first and then come home to the United States.

THE POOR COUNTRIES. The United Nations Population Division expects the "less developed countries" (i.e., LDCs, or poor countries) to grow by two thirds – from 4.9 to 8.1 billion – by 2050. This is despite some encouraging signs of fertility decline in most of those countries. Africa alone is projected to grow from 794 million to 2 billion.

I don't think they will get there. They cannot feed themselves now, and they will face tightening world food supplies. Moreover, poor countries' populations have been flooding into cities which have grown six fold since 1950 and are still growing. Those cities' services are on the point of breakdown. The very improvements in health services that started the population explosion are being undermined.

Whatever the precise growth curve, there are already – what? – billions of people desperate to leave the poor countries, and more to come. And, there or here, they are ready to work hard for almost any wage that keeps them alive.

THE INDUSTRIAL COUNTRIES. Except for the United States, industrial countries have grown very modestly and are now beginning to decline. The United Nations Population Division guesses they will decline thirteen percent by 2050. They are being reshaped by a phenomenon that we did not anticipate. Women are enjoying their new independence. They have nearly stopped having children.

Italy provides an extreme example. Italian women are averaging just 1.2 children. If their fertility does not rise, the population will descend 87 percent to eight million by 2100, absent immigration. With a quick return to replacement-level fertility (2.05 children), the population would stabilize at less than half its present level. If they try to fill the gap with immigration, almost all Italians will shortly be "new Italians."

Europe, freed from the need to feed a growing population, is experimenting with "extensive agriculture," undoing some of the most damaging practices introduced a generation ago. (Because of our continuing growth, the United States has less room for that sort of experiment.) Some decline in population will be very good for the environment, but the decline must stop. Europe and Japan must decide how small they want to be and how they can stabilize at that level. If they cannot raise fertility, they will face a Hobson's choice between immigration so massive that it will replace the existing stock or the

prospect of simply fading away. A functioning society is a complex thing. Can those civilizations survive a total demographic replacement?

Replacement is more likely than disappearance. There will be a vacuum as populations decline. Throughout the industrial world, a push/pull process is already driving immigration. The poor are desperate to come, businessmen want the cheap labor, and political leaders in aging countries will want workers. Modern communications have shown the poor the attraction of the developed countries; and modern transportation facilitates their movement.

Free trade will be a casualty if the industrial countries seek to restrict immigration and thus protect their workers' earnings, because their high-priced labor already finds it hard to compete against poor countries' low-wage labor, forces organized and trained by multinational corporations.

Where will fertility go? Young women are becoming the most powerful group in the industrial countries, as political leaders beg and bribe them to have children. Will the leaders succeed? History suggests they will not. Pro-fertility policies in Europe have had very little success. Will women generally decide on their own to have more children, again? It is one of the great demographic unknowns of our era.

The revolution in women's behavior will affect the more successful developing countries, too. A few, such as South Korea and Singapore, are already facing the same issues. However, population growth itself keeps the poorer countries from enjoying the general prosperity that has led to lower fertility. Their growth will probably be stopped by the bleak prospect of hunger, pestilence, and rising mortality.

In short, the forces driving migration will continue and probably intensify over the next generation and more. The situation in the poorest countries is so desperate that it is hard even to visualize a solution. Europe and Japan are in good shape to deal with their environmental problems. Europe, with the prospect of diminishing demand, is relatively secure in its food supply. Japan is not. Both are energy-short, but both have the capability to manage the energy transition away from petroleum – probably with a combination of nuclear and more benign energy sources. Both have that process under way. Their overwhelming question is whether they can manage their own fertility and migration.

Nations are used to dealing with migration, but not with fertility. Historically, most women have probably seen their fertility as something that just happened. As they learned they can control it, they have been interested in using that ability to achieve personal goals, not social ones. The idea that women's fertility is a social issue is a new one in human affairs.

The Profligate Giant

I have described the very different demographic trends intersecting in the world today and their consequence in an age of migrations. How will the intersecting demographic trends affect the United States? They are, almost certainly, driving the world toward

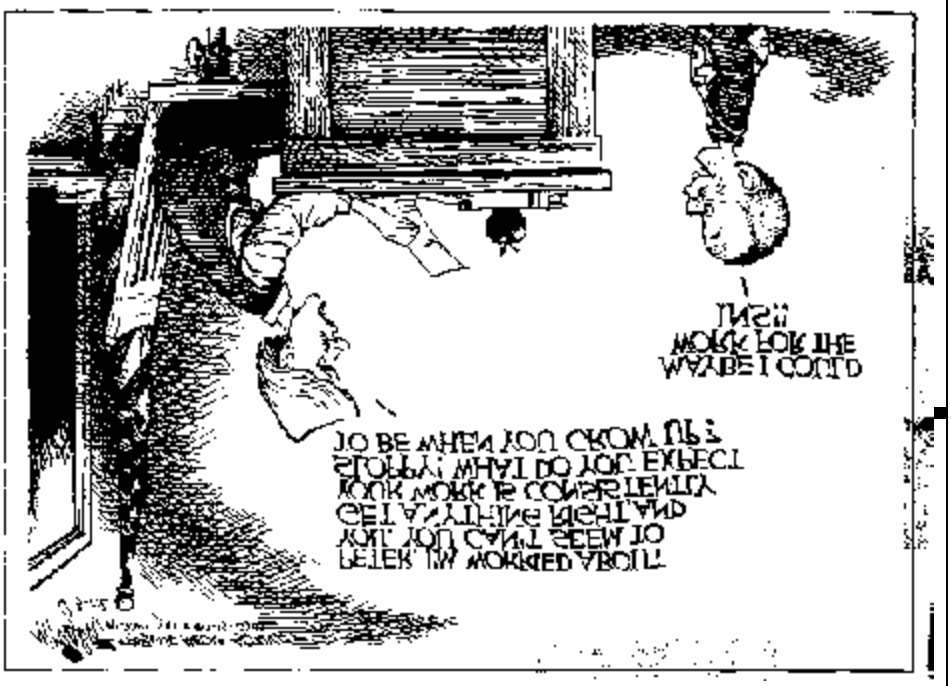
- a poorer environment, as rising populations make it progressively harder to manage the environmental issues we are struggling with,
- accelerated climate warming,
- more food and energy shortages in the poor countries,
- rising social and political tensions, within and among countries, partly the result of intensifying competition for land and water,
- increasing migratory pressures,
- rising U.S. dependence on imported fuels (from a part of the world that has demonstrated the uncertainty of the sources) and then, as the petroleum resources decline, an energy transition that will make most of us poorer.

The United States is changing profoundly as a result of those forces. Some of the changes are forced on us by poor countries' growth, but they are also the unintentional byproduct of our own behavior. We are creating a future that we never debated. Our population is rising 1.3 percent per year, mostly because of high immigration levels; and fertility is rising as more fertile groups come to constitute a larger fraction of the total. The Census Bureau middle projection is 403 million in 2050 and 571 million in 2100. We discovered in the 2000 census that growth is running ahead of the official estimates. The Census Bureau high projection puts us at 1.2 billion by 2100, the present population of China. And China is trying to stop growth while we – at least until the events of September 11, 2001 – have been pushing population upward through our immigration policy. Whether we go over a billion depends on how long the

migratory pressures continue and how the country responds to them.

The United States is starting to resemble India and China in numbers, in the extreme inequalities between rich and poor, and even in its food balance.

Let me focus on the food balance. We are still the residual grain supplier to the world – we provide one-third of all the grain entering international trade – but sometime in this century we will need the grain we now export. Right now, we export 28 percent of the grain we produce. With current yields and consumption habits, we will need that grain ourselves by 2029 (Census Bureau high projection) or 2049 (Census Bureau middle projection). If our population is expected to double or quadruple in this century, it will take a remarkable increase in grain yields – in the face of the constraints I described earlier – and considerable austerity, to take care of our own population, to say nothing of exporting grain. And, if we run out, there is no country that can supply our needs.



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constitute a larger fraction of the total."

If there is free trade, world prices will rise, and the poorest will suffer, worldwide. With restrictions on U.S. exports (which we imposed once before on soybeans in the face of one poor harvest), the food-deficient nations will face starvation.

The escape from this conundrum might seem to lie in raising worldwide grain yields. Beware. For one thing, there is no certainty we can do so; and it may be dangerous because of our reliance on chemicals and pesticide inputs. Yields rose dramatically from the 1950s until the mid-1980s, but they have been flatter and fluctuating in recent years. Yields do not respond to fertilizers as they did before. Worldwide grain production rose 2.7 percent annually in the 1960s and 1970s, and 2.5 percent in the 1980s, but only 0.5 percent in the 1990s (Food and Agriculture Organization FAOSTAT data) – much less than population growth.

What is possible? Nobody really knows. Yields in the developed countries are perhaps the best rough indicator of what can be done. Total grain production in those countries has been stagnant for 20 years, but yields are thirty-five percent higher than in the poor countries. Moreover, corn and wheat yields in the United States have averaged higher in the 1990s than ever before. The optimist would say, "Look, there is plenty of room for growth." More realistically, remember that the poor countries' population growth would eat up that thirty-five percent differential in a generation, even if they could achieve such yields. And what are the chances of narrowing the differential, without the agricultural support structure of the rich world, without its capital or organization, with constantly diminishing plots of land per farmer, and with land erosion, loss of arable land and water shortages staring at many of the poor countries?

There is a furious debate about genetic modification, but no assurance that it can bring back the growth of the 1950s-1980s; and it is another of those unplanned experiments whose potential ramifications we see only dimly. Climate warming may help food production, but is

more likely to hinder it, especially in the poor countries.

Any solution to the world food problem will require a rapid slowing and then a reversal of poor countries' population growth. That in itself would be painful, because a slowdown creates a shortage of working-age people for about two generations.

We can look back fifty years and ask ourselves a rueful question: could we in the prosperous countries have imagined that we ourselves might be so profoundly affected by the revolutions we helped to start? Why didn't we think ahead and consider the implications of changing one side of a natural equation without changing the other? Why are we still afraid to address it?

What should we do? At a practical level, the United States must address an immigration policy gone out of control. We should assure that poor American women have access to family planning. We should, belatedly, promote population-planning assistance from a stepchild of our foreign-aid program to its central feature. It would help the poor countries and offer us an eventual amelioration of migratory pressures. Most poor countries recognize their population problems, as we do not, and have asked for assistance in addressing it.

At a more fundamental level, we should re-examine our growth-oriented view of our numbers and our consumption levels.

We must ask ourselves, "What are the consequences of our present courses of action?"

Proponents justify growth by the need to accommodate the requirements of expanding populations for food and jobs and a decent living. The argument is circular. If we did not need to provide for more people, the only justification for growth would be to improve the lot of the poor. And that could best be achieved if there were fewer of them. Western Europe and Japan show that population growth is not a prerequisite for prosperity.

In the United States, we are afraid to address fertility because one faction gets it entangled with the abortion argument, and another faction sees it as "interference with women's right to control their own bodies." We are afraid to address immigration, because for some it is a convenience and because moralists see an obligation to give the stranger the opportunities we have had. We still do not recognize it as the principal present determinant of our future.

If we do not develop a better vision of our future and start moving toward it, we may get where we are presently heading. •