

Thoughts on Immigration Into the United States

BY ALBERT A. BARTLETT

The editors are pleased to reprint this article by Professor Albert Bartlett, which summarizes his views on the link between population growth, immigration policies, and other issues. This serves as a concise set of arguments against mass immigration. Our thanks to Negative Population Growth (NPG) for granting TSC permission to reprint this article. Other articles by Professor Bartlett are archived online at www.albartlett.org

Introduction

Immigration is currently very much a hot button item at the local level, the state level, and nationally. Public discussions generally focus on three separate aspects of immigration: first, law and order; second, economic; and third, humanitarian.

In the law and order discussions we hear advocates stress that the success of our democracy is based on respect for the laws of the land. By implication, those who are here in violation of these laws should not be here, nor should they be beneficiaries of governmental programs.

The economic discussions offer the assertion that we must import people because we can't find Americans who will do the work of America.

The humanitarian aspect centers on the assertion that "We are a nation of immigrants" and that therefore, without question and without limit, we must open the doors. This aspect also says that we must always welcome more immigrants, legal and illegal, including their immediate and extended families, whether they are fleeing tyranny, or are simply seeking to improve their situations.

I wish to focus on a fourth aspect that is crucial to our national long term survival but which, like Mark Twain's "Silent Lie,"¹ is almost never mentioned in the polite conversations or in the heated rhetoric that we encounter in the discussions of the first three aspects of immigration.

Albert A. Bartlett, Professor Emeritus of Physics at the University of Colorado at Boulder, died September 7, 2013, at the age of 90.

The numbers aspect

The fourth aspect of immigration is the "numbers aspect."

What I will demonstrate is that the population of the United States has exceeded the carrying capacity of our land. This means that the U.S. in 2007 is overpopulated.

Operationally, this means that in 2007, the economy of the United States is not sustainable.

From this it follows that any actions that increase the population of the U.S. move us away from sustainability and hence should be stopped.

Immigration, legal plus illegal, is the main driver of population growth in the U.S. in 2007; therefore any discussion of sustainability in the U.S. must address the need to reduce or eliminate immigration, both legal and illegal, into the U.S.

From the demonstration that the U.S. is overpopulated, it follows that the United States has an urgent need for a national policy that would lead to a gradual and humane reduction of the U.S. population to a sustainable level. Such population reductions are taking place today in much of Europe, where they are a consequence of the complex social and economic evolution of European societies. Unfortunately these European reductions are not recognized as being the constructive steps that are necessary in order to move societies toward sustainability.

This lack of recognition has tragically led some thoughtless European governmental leaders to extrapolate their declining populations to predicted extinction in a few centuries. To head off this extrapolated extinction the leaders seek to generate great alarm among their citizens. These leaders are flagrantly unaware of the meaning of sustainability, so they speak in apocalyptic terms, appealing to national pride, calling for their people to get "back into production."

The meaning of sustainability

Let's take a moment to think about the meaning of sustainability. The concept of sustainability of a society implies that the operations of the society must be conducted in such a way as to allow these operations to con-

tinue for a long time in the future. How long? Certainly long compared to a human lifetime. We have to be thinking in terms of centuries.

Growth is the centerpiece of the U.S. and world economies. The arithmetic of growth shows that modest rates of growth continuing for periods comparable to a human lifetime yield numbers that are impossibly large.² Sustainability requires that the society must operate so as to avoid these impossibilities. But the impossibilities are all caused by population growth.

Thus “sustainability” and “population growth” are in direct conflict with one another. It does not matter that politicians, who love to be on both sides of issues, frequently say that population growth and sustainability (saving the environment) are compatible. In general, they are not. Contrary to what the politicians preach, you can’t have your cake and eat it too. A great contemporary tragedy is the fact that many politicians fail to recognize that the term “sustainable growth” is an oxymoron.

The first and second laws of sustainability

The first two Laws of Sustainability follow from two things: First, the long-term implications of the meaning of the word “sustainable,” and second, the simple arithmetic of growth.

First Law: Population growth and/or growth in the rates of consumption of resources cannot be sustained.

Second Law: The larger the population and/or the larger the rates of consumption of resources, the more difficult it will be to make the transition to sustainability.³

The world is overpopulated

Before we demonstrate that the U.S. is overpopulated, we can show that the world in 2007 is overpopulated. This is proven by the following observation:

“If any part of the observed global warming is due to the activities of humans, then this, by itself, is positive proof that the world population, living as we do, has exceeded the carrying capacity of the Earth.”

Beyond any question, the human contribution to global warming proves that the Earth is overpopulated.

The tragedy of the “experts”

All manner of technical “experts” are writing and speaking and making films in which they give advice on how to deal with global warming. They scare the bejeepers out of us by showing all manner of developing ecological disasters, which they often correctly attribute to growing populations. These “experts” then list dozens of little things which, if pursued widely, would reduce slightly the rate at which global warming is getting worse. Tragically, one almost never hears one of these “experts” recommend that we address the fundamental

cause of global warming, namely overpopulation.

More on global overpopulation

This conclusion that the Earth’s population has exceeded the carrying capacity of the Earth is supported in more detail by a large body of work on “ecological footprinting” that originated with the work of Wackernagel and Rees at the University of British Columbia.⁴ Ecological footprinting is a quantitative method of estimating how large an area of land each of us requires in order to provide us with the continuous unending supply of food, fiber, and fuel that we need to maintain our standard of living and to absorb our wastes. For an individual, this required area of land is the individual’s “ecological footprint.” The summation of the footprints of all the people of Boulder, Colorado is Boulder’s ecological footprint. The summation of the footprints of all of the people of the United States is the total ecological footprint of our nation.

Because of the large variations in the average standard of living in different countries, the average per capita footprints of different nations vary enormously. For India it is 0.4 hectares per person. For the U.S. it is about 5.1 hectares per person. When they are all added together, the footprint of the world’s population today (2007) is something like 1.3 Earths. Wackernagel and Rees report (Pg. 91) that “To accommodate sustainably the anticipated increase in [world] population and economic output of the next four decades we would need six to twelve additional planets.” The impossibility is obvious. Yet politicians, and the developers who support the politicians, continue eagerly to promote more population growth.

Professor David Pimentel of Cornell University is a global agricultural scientist. From his studies of global agriculture, he estimates that an agriculturally sustainable global population, living at the current average dietary level of the United States, is about 2 billion people.⁵ In 2007, the Earth’s population was about 6.7 billion. The problem is obvious.

Interest vs. principal

Until a few decades ago, people of the Earth were living from the sustainable interest income provided by the Earth’s ecosystems, but now, largely because of population growth, our demands have exceeded the sustainable interest income from the global environment. We are consuming the principal in the Earth’s ecological bank account. We are degrading and depleting the global environment upon which all life depends. The decline in the world’s major fisheries is but one of many lines of evidence that points to the fact that the population of the Earth in 2007 is not living sustainably.

Let’s look at some numbers:

First, let's look at the global numbers. The world population is growing a little over 1 percent per year. That does not sound like much, but if it continues at the current rate, it could lead to doubling the Earth's population in about 70 years. The good news is that the growth rate is declining slowly. The bad news is that, in spite of the decline in the growth rate, the world population is growing by something like 75 million people per year, or about 8,600 people per hour. The world population is projected to stop growing and level off at something like 9 to 12 billion later in this century. The demographers who project several billion more people in the next 50 to 100 years apparently never ask if food and resources will be available to support these additional people.

At the high end, some underdeveloped nations have population growth rates of around 2 percent to 3 percent per year. In the middle, with a growth rate approximately equal to the world's average growth rate, is the U.S., with a growth rate of about 1 percent per year. At the bottom are the countries of Europe, most of which now have zero or negative population growth rates. The United States has the highest population growth rate of any industrialized country!

Looking at the numbers, and using first-order logic, would lead a person to say that the annual numerical population increases of underdeveloped countries are the largest, and that therefore these countries are the Earth's worst offenders in terms of global overpopulation. But we have to look farther.

It may have been at the World Population Conference in Mexico City in 1984 that it was reported that the U.S. representatives lectured to the representatives of the underdeveloped countries that have rapidly growing populations, telling them that their countries were the problem because of the large annual increase in their populations. The representatives of these countries are said to have replied by pointing out that a child born in America will, in that child's lifetime, have ten or twenty times the impact on world resources as will a child born in Africa. The reports indicated that our U.S. representatives were told to go home and take care of the problem in the U.S. A clear case can be made that the world's worst population problem is right here in the U.S.⁶

Some years ago, when he was a United States Senator from Colorado, Tim Wirth spoke at the University of Colorado at Boulder. He pointed out the obvious, saying words to the effect that we can't tell other countries that they must stop their population growth, unless we first set an example and stop our own population growth here in the U.S. This elemental truth seems not to be understood or accepted, or even recognized, in the U.S.

None the less, American environmental organizations, as well as pious Americans, who wish to demonstrate concern about overpopulation, rarely focus on

the real and local problem of population growth in the U.S. which they could help solve if they wished. Instead they elect the easier and more politically correct option of pointing to "those people" in distant undeveloped countries, claiming that we need to help "those people" because they are the problem.⁷

This is similar to racial profiling.

Look at some numbers for the U.S.

We now turn to the United States, which we will see is already overpopulated. To make things worse, the U.S. population is growing by something like 3 million additional people every year.

Our U.S. population growth comes from two sources: natural increase, which is the annual excess of births over deaths, and net immigration.

If one counts immigrants and first-generation children born to immigrant families, immigration, legal plus illegal, accounts for something like three-quarters of the current U.S. population growth.

Here are some of the conclusions from a recent report.⁸

- Currently, 1.6 million legal and illegal immigrants settle in the country each year; 350,000 immigrants leave each year, resulting in net immigration of 1.25 million.
- If immigration continues at current levels, the nation's population will increase from 301 million today [2007] to 468 million in 2060 — a 167 million (or 56 percent) increase. Future immigrants plus their descendants will account for 105 million (or 63 percent) of the increase.
- If the annual level of net immigration was reduced to 300,000, future immigration would add 25 million people to the population by 2060 — 80 million fewer than the current level [of immigration] would add.
- Net immigration has been increasing for five decades; if that trend continues, the increase caused by immigration will be higher than the projected 105 million.

Projections from the U.S. Census Bureau show that in the absence of any net immigration, the U.S. population growth would slow down and level off in about 30 years, leaving us with a population of something like 350,000,000. If fertility continued to be below the replacement level, as it is in much of Europe, the U.S. population size would then start to decline slowly and naturally in the direction of a sustainable U.S. population. With immigration continuing at present levels, or at the even higher levels that are often advocated by many members of the Congress, there can be no projected

limit to population size of the U.S.

When I was born (1923) the population of the U.S. was on the order of 100,000,000 people. We have just passed (in 2007) 300,000,000 people. Are we in the U.S. ready for 400,000,000 or even more in another fifty years or so? David Pimentel has estimated that an agriculturally sustainable U.S. population, living at today's average U.S. dietary level, is something like half of our present population, or about 150 million, which is roughly our population shortly after World War II.

The first two Laws of Sustainability show that:

U.S. population growth is the major impediment to the achievement of sustainability of the United States.

This, plus the fact that immigration, legal plus illegal, is the largest component of population growth in the U.S., combine to make the case that continued immigration is the largest threat to sustainability of the United States. We must note that most of the immigration into the U.S. is legal.

Indeed, members of the two political parties vie with each other to see which party can produce legislation that will let in the largest annual flow of legal immigrants. This is not simply unsustainable, it's antisustainable.

A very dramatic visualization of the importance of numbers in evaluating the role of immigration in the U.S. is given by Roy Beck in a video presentation called, *Immigration by the Numbers*.⁹ This 15-minute video is the best presentation I have seen of the quantitative effects of immigration on the United States.

The unsustainability of U.S. agriculture

The growing U.S. population requires a growing supply of food, for which we proudly turn to the miracles of modern agriculture. Modern agriculture has been characterized as "the use of land to convert petroleum into food." But with modernization has come decreasing efficiency of the use of energy in agriculture. It is estimated that agriculture in the U.S. requires approximately ten or more units of energy from fossil fuels to produce one unit of food energy on our dinner plate. At this roughly 10 percent efficiency, modern U.S. agriculture is the least efficient in the world, and the efficiency is getting worse each year. The immigration-driven growth of U.S. population increases the annual need for this inefficiently produced food and this exacerbates the national energy situation that is already very bad.

But agriculture is dependent on petroleum and natural gas, so let's see what's happening to petroleum and natural gas.

Background: the Hubbert Peak

We need a bit of background. The life history of the rate of production (barrels per year) of a finite nonre-

newable resource such as petroleum, started at zero 200 years ago. It will rise to one or more maxima, and then it will decline to zero a century or so after the maximum. This behavior can be approximated by a Gaussian Error Curve, which is a curve with a single smooth peak. The curve is called the Hubbert Curve and the peak is called the Hubbert Peak. The Curve and the Peak are universal phenomena that are only marginally affected by economics, politics, and technology.

The Hubbert Peaks for petroleum

As shown in Fig. 1, the Hubbert Curve for petroleum production in the U.S. peaked in 1970 and petroleum production in the U.S. is now approximately half what it was at the peak. Petroleum production in the U.S. is declining, and except for the possibilities of small shortterm bumps, is destined throughout the future to continue its steady downward trend toward zero. Because of this decline, we in the U.S. now have to import over 60 percent of the petroleum we consume. My analysis, based on Fig. 1, suggests that as of 2005 we have consumed about 85 percent of the recoverable conventional petroleum that was ever in the ground in the United States. In the future, continued population growth in the U.S. will result in more people chasing after the remaining dwindling supply. Fig. 1 below might be called a "Portrait of National Unsustainability."

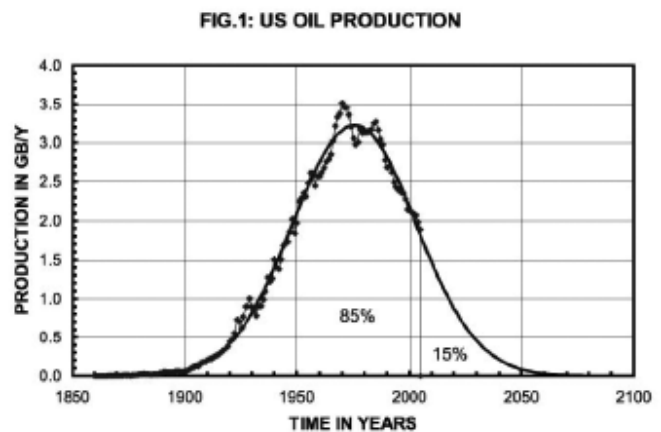
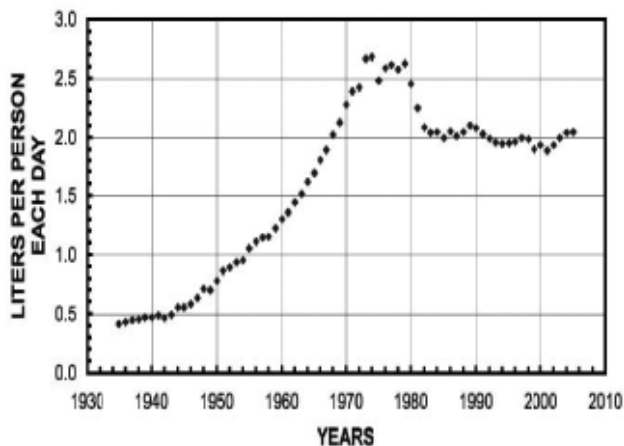


Fig. 1: Gaussian Hubbert Curve fitted to data on U.S. production of conventional petroleum through 2005. The left part of the curve up through the highest peak in 1970 shows production for the lower 48 states. Then the Alaska Pipeline started to deliver oil which was added to the production in the lower 48. The Alaskan production peaked in the mid-1980s and is the secondary peak to the right. Now production in the 50 states is declining steadily. The area under the entire curve represents all of the conventional petroleum that was ever in the ground in the U.S. before any of it was used. The area under the curve up to the line drawn at the year

2005 represents U.S. oil that has been taken from our ground and has been used. It is 85 percent of the area under the entire curve. The remaining area to the right of the line at 2005 is only 15 percent of the total area.

There is intense debate as to whether world petroleum production has already peaked or whether the peak may be as late as the year 2030. The published results of my calculations suggest the world peak will be much closer to 2007 than to 2030.¹⁰ However, if we look at world per capita oil production, we find that because of the growing world population, the peak in world per capita petroleum production was passed in the 1970s. See Fig. 2.

Fig. 2: WORLD PER CAPITA PRODUCTION OF CONVENTIONAL PETROLEUM
Production data from Colin Campbell



I suspect that historians in the future will look back at the 1970s peak of world per capita petroleum production as being the most important event in the entire history of the human race.

As seen in Fig. 2 (above), in 2005 world petroleum production per capita was approximately two liters (half a gallon) per person per day. So any day that any one of us uses, directly or indirectly, more than about half a gallon of petroleum, we're using more than our share!

The early 1980s population was growing more rapidly than production. Since the mid-1980s production and population have been growing at approximately the same rate, so the curve is approximately flat with a per capita production of about two liters per day.

The Hubbert Peak for natural gas

Natural gas production in North America has already passed its peak, and in spite of the drilling of hundreds of new gas wells annually, we have not been able to prevent a slow decline in the annual production of natural gas in North America. Because of population growth in North America, demand is growing. Yet sup-

ply is declining, and now in North America demand for natural gas has exceeded supply. As a temporary expedient, enormous efforts are currently being made to construct expensive large port facilities on the three coasts of the U.S. to permit the importation of liquefied natural gas from places including North Africa, the Middle East, and Indonesia, all of which are Muslim countries. I think the chances are better than 50:50 that the peak of world production of natural gas will be reached before 2025. Passing the peak of world production of natural gas will speed the already rapid rise in the price of natural gas, and this will predictably bring great and widespread hardships throughout the U.S. and the world.

The Hubbert Peaks for U.S. petroleum and for North American natural gas constitute incontrovertible evidence that the U.S. is overpopulated and that steps should be taken immediately to halt the growth of our population and to let the population decline naturally to a level that can be sustained.

The U.S. economy is not sustainable

Here are several more lines of reasoning that lead to the conclusion that in 2007 the U.S. is overpopulated and hence is not sustainable.

In order to maintain our economy, we now import something over 60 percent of the petroleum we consume. This fraction is growing. To make things worse, our U.S. foreign policy seems aimed at alienating the nations from which we obtain our imported petroleum. We import from Canada approximately 20 percent of the natural gas we consume and this is something like half of Canada's production. Canada's domestic demand for natural gas is rising while the Canadian production of natural gas is declining. We import 15 percent to 20 percent of the food that we eat. This growing fraction is putting the health of Americans at risk because the increasing imports of food have overwhelmed the government agencies responsible for inspecting imported food to protect the health of Americans.

Going full speed ahead, we are entering a tunnel and no light is visible at the end of the tunnel.

Zero growth of the population of the U.S.

In 1995, a colleague in Washington and I published a paper, "Zero Growth of the Population of the United States."¹¹ Our analysis showed that to achieve zero growth of the U.S. population instantly we would have to have zero net immigration and one child per family. The one child per family could gradually increase with time until it leveled off at two children per family in fifty to seventy years and the population thereafter would be stable. (A word is in order about "net immigration." It is estimated that something like 200,000 citizens leave the U.S. voluntarily each year. If we admit 200,000 immi-

grants a year we would have zero net immigration.)

Predictable short-term problems

The reversal of our U.S. population growth is a necessary condition for sustainability. This reversal will result in a reduction of the fraction of our population that is in the working-age range, and this will produce predictable serious short-term problems with social security systems for the elderly. However, these short-term problems are nothing compared to the long-term problems that will arise if we allow population growth in the U.S. to continue. A separate aspect of the study⁸ from the Center for Immigration Studies shows that high levels of immigration into the U.S. will do little to remedy this serious shortage of young working-age people.

A note on China's experience

Washington politicians talk about the importance of competing in the high-tech world and about global leadership in economic growth. China has the same goals. China has had stunning success in achieving these goals, but Washington politicians have not understood a lesson of China's recent economic successes. About thirty years ago, the People's Republic of China launched its very coercive policy of "One Child per Family," which has been widely criticized by the United States. The official government statement of justification of the new Chinese policy, in effect, is that "Population growth interferes with economic development." By cutting their population growth rate approximately in half, the Chinese have made it possible to increase their annual economic output enormously. We in the U.S. need to recognize that population growth interferes with economic development.

There are other benefits from slowing population growth. "The number of births avoided [in China by the coercive 'one child per family' policy] equals the entire [2007] population of the United States, [about 300,000,000]. Beijing says that fewer people means less demand for energy and lower emissions of heat-trapping gases from burning fossil fuels." Thus "China rejects criticism that it is doing too little to confront climate change."¹²

The chicken and the egg situation

Here is a dilemma that is faced by young people in the U.S. as they seek education and then employment to help meet our national goals relating to technological development. The National Science Foundation supports educational programs designed to attract more American students into science and technological educational programs. Yet high-tech industries in the U.S. complain that the U.S. education system does not produce a sufficient supply of workers with the needed special technologi-

cal skills. Using the alleged shortage of hightech workers, representatives of the hightech industries in the U.S. frequently lobby the Congress in Washington for more special visas to allow the industries to bring skilled hightech workers into the U.S. from other countries.

At the same time, in the education system, students contemplating going into science and technology may choose other fields because they read frequent news stories of American high-tech workers in midcareer losing their jobs with American companies because their jobs are being outsourced overseas or because the American high-tech industries are replacing American workers with technical workers from other countries who are admitted to the U.S. using the special visas approved by Congress. An aspiring student of science and technology can see the handwriting on the wall: Spend years preparing for a technological career and there's a good chance that after a few years on the job, your job will be outsourced or you will be replaced by an immigrant from Asia. What's the student to do? We've put ourselves in a death spiral.

To deal effectively with this serious problem, we must have national policies that limit outsourcing of American high-tech jobs and that limit the importation of high-tech workers from abroad. If we can assure today's young people that careers in science and technology in the U.S. are secure and stable, then we will be able to get improved returns on the investments in science education being made by our government.

The Rockefeller Commission Report (1972)

The Commission on Population Growth and the American Future reported "To the President and Congress of the United States" on March 27, 1972. In the cover letter the Commission reported that:

After two years of concentrated effort, we have concluded that, in the long run, no substantial benefits will result from further growth of the Nation's population. The gradual stabilization of our population through voluntary means would contribute significantly to the Nation's ability to solve its problems. We have looked for, and have not found, any convincing economic argument for continued population growth. The health of our country does not depend on it, nor does the vitality of business nor the welfare of the average person.

In addressing immigration, the Commission made this humane recommendation:

The Commission believes that it is imperative for this country to address itself, first, to the problems of its own disadvantaged and poor. The flow of immigrants should be

closely regulated until this country can provide adequate social and economic opportunities for all its present members, particularly those traditionally discriminated against because of race, ethnicity or sex.

Because the Rockefeller Commission's recommendations have been ignored in the years since they were made in 1972, the recommendations of the Commission are even more relevant in 2007 than they were in 1972.

Trade agreements and colonialism

In order to support and encourage our economic and population growth, we have been aggressively pushing all manner of international trade agreements to allow us in the U.S. to get our hands on the resources of other nations so we can consume these resources before the people of these other nations can develop to the point at which they will need to use their own resources. From our point of view this is fair trade and free enterprise. From the point of view of the impoverished people from the resource-rich countries, this is colonialism.

The term "security of supply" is now frequently invoked by industrialized nations that have mindlessly depleted their own supplies of fossil fuels and that want to try to guarantee a steady flow of these vital resources into their own countries. The need for "security of supply" is now offered as justification for this new colonialism. This new colonialism means that we are bequeathing to our children a world in which the people of presently undeveloped nations will, in the future, embark on modernization only to find that their indigenous fossil fuels and other critical resources have already been plundered by the industrialized world, led by the U.S. This will certainly contribute to increased unrest and terror.

Population growth never pays for itself

In spite of the recommendations of the Rockefeller Commission, people who profit from population growth would have us believe that continued growth is good for all Americans, and they ignore the fact that population growth never pays for itself.

It's enlightening to look at the costs of population growth at the local level. A few years ago, a study by a planner in Oregon showed that every new home constructed in Oregon costs Oregon taxpayers on the order of \$25,000.¹³

This is pretty much the same in all parts of the country. In order to pay the public costs of growth we have to either raise taxes or cut public services. As an example, population growth and economic growth have not reversed or remedied the dangerous deterioration of our national highway infrastructure.

This widely applauded population growth has not

provided the funds necessary to maintain properly our public infrastructure such as highways and bridges. The situation becomes more dangerous and desperate with each year of continued population growth. The more we grow, the "behinder" we get.

Population growth destroys democracy

Immigration is the major factor that is driving U.S. population growth, and this population growth is destroying our democracy. Isaac Asimov wrote that "Democracy cannot survive overpopulation."¹⁴ Let me give you two examples of the decline in democracy that is the direct consequence of U.S. population growth.

First, a local example: When I joined the faculty of the University of Colorado in the fall of 1950, the population of Boulder was 20,000 and there were nine members of the Boulder City Council. Today (2007) the population of Boulder is something like 100,000 and we still have nine members of the City Council. The number of constituents per council member today is five times what it was in 1950.

Consequently, democracy in the government of Boulder has declined to only 20 percent of what it was 57 years ago. In this period, the loss of democracy in Boulder has averaged 2.8 percent per year.

The population growth of the United States in the decade of the 1990s was 13.1 percent. Because the membership of the U.S. House of Representatives is fixed at 435, one can conclude immediately that in just one decade, democracy at the national level in the U.S. declined by 13.1 percent.

In more detail, we know that after each decadal census, the congressional district boundaries must be redrawn to accommodate the population growth. After the 2000 census, each congressional district had to be redrawn to raise the population of each district 13.1 percent, which is from about 600,000 to about 700,000 people. That's 10,000 extra constituents every year in every congressional district! This is an enormous devastating dilution of democracy, which is being driven by continuing population growth which arises mainly from immigration.

Using commercial and military methods, we are trying to advance the concept of democracy in other countries while we are allowing our immigration-driven population growth to slowly destroy democracy at home in the U.S.

Numbers and the other aspects of the immigration debate

Do the numbers speak to the first three aspects of the immigration debate?

Law and order: Our American constitutional system is based on law and order. One certainly would not

want to have a lawless society. Perhaps I'm wrong, but I have the impression that lawlessness is more common in large crowded cities than it is smaller density societies.

Economic: The Seventh Law of Sustainability addresses the arguments in the economic aspect of immigration. (3.c)

The Seventh Law asserts that if a country has to import people to do the work of the country, then that country is not sustainable. We have all heard the plaintive cry that "We can't get Americans to do the work, so we have to import workers from other countries." Think about this for a moment. This is an absolute indicator of national unsustainability!

Humanitarian: The numbers give us little guidance in evaluating the humanitarian aspect of immigration. One must weigh the costs and the benefits of continued high levels of immigration, both legal and illegal, to the individuals and to the society. One must be aware of who gets the benefits and who pays the costs. In particular one must ask, "What are the costs to the society of continuing the population growth that is moving us ever farther away from sustainability?"

Immigration and slavery

In significant ways, today's tragedy of immigration is similar to the tragedy of slavery in our nation's early history. Two hundred years ago the "civilized" world incorporated slavery into an economy that quickly became dependent on slaves "to do the work that Americans would not do." Economics was used as a justification for slavery. It took more than a century of tragedy and turmoil to rearrange things so that the economy could function without the low-cost labor and the terrible injustice of slavery. Today the same economics is used as a justification for immigration. The business community wants a large supply of low-cost labor and a larger population of consumers. It is time to rearrange things so that the work of the U.S. can be performed by U.S. citizens.

And then think about this: Is it rational to have national policies that lead the U.S. to be simultaneously exporting jobs and importing people?

We are now living on the edge

Let's now go back to aspects of the world picture that affect the overpopulated United States. Through much of the history of the production of petroleum, the world has benefited from having spare petroleum production capacity. If bad weather, accidents, or political decisions reduced production in one part of the global system, the lost production could be quickly replaced by bringing on line some of the spare pumping capacity in Saudi Arabia or elsewhere. If the price of oil was too high, some of the spare capacity could be engaged

to bring another million barrels a day onto the market in order to cause the price of oil to drop back down to the desired level. The supply system was flexible and resilient. Demand growth is largely driven by population growth, and so now demand is very nearly equal to supply. The cushion of spare capacity is pretty much gone. As a result, small interruptions in supply are magnified and consequently have far-reaching economic effects both in the U.S. and in the world. The effects on the U.S. become larger as our population gets larger. We're in a new economic regime for which we seem to be ill prepared because the economics of the rising left side of the Hubbert Curve may be quite different from the economics of the falling right side of the Curve.

The law of receding horizons

The serious supply problems that we face as our population continues to grow are often dismissed by those who talk glibly about the development of alternative energy sources, such as oil shale. We can learn about some of the problems of developing alternative fuels from an observation that has circulated in the oil shale community. The observation suggests that oil shale will provide economical fuel when the price of conventional petroleum is \$10 a barrel higher than it is today. People go on to joke that this is true today and it will always be true.

The unspoken assumption in the original observation was that if costs remained unchanged from today's levels and if the price of conventional petroleum went up by \$10 a barrel, then it would be economical to produce fuel from oil shale. The fallacy is that when the price of petroleum rises by \$10 a barrel, it affects prices throughout the entire economy which all rise in unison. As a result, the price of the development of oil shale goes up and consequently the development of oil shale is no longer economically feasible. This is an example of the Law of Receding Horizons.¹⁵ This will affect the development of all alternative energy sources.

Eric Sevareid's law

And when we're searching for solutions to the problem of growing demand exceeding supply, we should never forget Eric Sevareid's Law.¹⁶ Sevareid was a national journalist, and he observed that: "The chief source of problems is solutions."

As an example: the actions of the Congress to encourage domestic production of ethanol from corn were offered as the solution to the problem of impending shortages of automotive fuel that are the result of population growth. Corn is being diverted from the food supply to the fuel supply. As a direct consequence, the price of corn has risen rapidly and this affects the prices of all manner of food items. The higher food costs are the

new problem caused by the solution to the problem of the impending shortage of automotive fuel. In the U.S. and abroad, this higher cost of food is a hidden tax on all who eat. The more we turn to science and technology for solutions, the greater are the new problems brought on by the technological solutions.



CBS broadcast journalist Eric Sevareid

Ever since hunter/gatherers evolved into agriculturists, one of the principal consequences of science, technology, and planning have been to solve the problems that restricted or limited population growth. The problem-solving allowed the society to grow, thus creating problems on an ever-expanding scale. The genie is out of the bottle and is now overwhelming us with overpopulation. Science and technology (and interestingly, urban planning) can help create better lives for all people only if they are accompanied by a complete cessation of population growth.

A world of limits

Few are willing to recognize that we live in a world of limits. It's easier to believe the educationally credentialed nonscientists who assure us that there will always be an abundance of resources. It's easy and pleasant to

think that the future will be just an extension of the past, only bigger. It's also easy to believe the "experts" who assure us that market forces will solve future problems. Since market forces got us into our present precarious position, it seems unreasonable to expect that market forces will somehow solve these problems. Many people believe that science and technology will remove the limits. We have been using the best available science and technology for decades and we are still falling behind in trying to solve the problems brought on by population growth. In addition, there is a whole host of new problems that arise directly from the new and improved technologies that are being developed and deployed to try to help solve the problems. Over 200 years ago, Malthus anticipated that population growth could overwhelm our vital support systems. Now we can see signs that this is beginning to happen.

Limits to growth

The publication in 1972 of the book *Limits to Growth* startled the world.¹⁷ It challenged the prevailing belief of the global community of nonscientific "experts" who confidently asserted that population growth and growth in the consumption of resources could continue indefinitely. The book reported on a computerized study by a systems analysis group at MIT. Sticking to fundamentals, the group used a computer to model the global economy. The model predicted that the global economy, and the populations that are dependent on this economy, would suffer a massive collapse in mid-twenty-first century. The book triggered an outburst of denial and rejection from many educationally credentialed nonscientists because the outcome was too terrible to be true. We now see the pieces of the puzzle are starting to fall in place in a predictable manner. Passing over the peaks of the production of petroleum and natural gas will trigger a rising trend of the prices of these critical resources, which will reverberate throughout the entire economy. There will be ups and downs in the prices of fossil fuels, but the future trend will most certainly be rapid price escalation without limit.

Copycat peaks

All of the essentials of our economy, such as food, are dependent on petroleum and/or natural gas. The global annual harvest of foods can be expected to peak and then start its decline not long after the peak global production of petroleum is reached. These copycat curves in all sectors of our economy will all follow from the Hubbert Peaks for petroleum and natural gas. This has been explored in detail by Heinberg.¹⁸ As shortages cause prices of these fuels to rise, there will follow price rises in every sector of our economy. This will trigger hardships without relief.

Past civilizations

The world is full of ruins of ancient civilizations that have flourished and then foundered. The causes of the demise of these ancient civilizations are many, but prominent among them is the fact that urban populations grew beyond the capacity of the available land to support the civilizations.

The available land was generally defined by the range of the crude animal-powered transport of the day, which was used to bring food to the urban areas from the surrounding countryside. Transport technology has increased the range of available land from which we can draw food and other resources, and this has led people to believe that technology has removed the problem of limits. As a result, educationally credentialed scholars (Ph.D.s) have asserted vigorously that Malthus has thus been proven wrong. Transportation technology, based on petroleum, now allows us to import goods from almost any place on the Earth.

The average item of food on our plates is estimated to have traveled something like 1,500 miles from the site where it was produced. With global petroleum production peaking in the near future, we are now beginning to see the long-predicted global limits, which are absolute and which, in many cases, can't be further extended in major ways by technology. Malthus understood much more than his critics give him credit for. Technology has staved off the Malthusian crisis for 200 years, but it is now clear that Malthus was right.

The ultimate challenge

In debates, proponents of zero or negative population growth are usually on the defensive. We should turn the tables so the proponents of continued population growth are challenged, as follows, to defend their position.

Can you think of any problem, on any scale, from microscopic to global, whose long-range solution is in any demonstrable way aided, assisted, or advanced by having larger populations at the local level, the regional level, the national level, or globally?

The term long-range is emphasized in order to counter those who claim that population growth is needed in order to fund social security systems. This short-range problem is real; however, increasing the population can not provide a long-term solution to this problem. The word demonstrable is emphasized in order to dispose of the suggestion that more people means more brains available to solve problems. This is more speculative than demonstrable.

Conclusion

So, no matter how you feel about the law and order, the economic, and the humanitarian aspects of immigra-

tion into the U.S., a simple examination of the numbers makes it clear that the population of the U.S. is already much larger than the size which can be sustained. As a consequence, and as indicated by the Rockefeller Commission Report, further population growth, which is largely driven by immigration, aggravates the present problem of overpopulation in the U.S. The increased natural resources that we consume annually because of population growth will be needed by the people of the countries from which we are now taking resources. Our children and grandchildren will need resources. The pie is no longer growing. To try to accommodate larger populations, the pie is now being divided into ever smaller pieces. David Brower once observed that "Promoting growth is simply a sophisticated way to steal from our children."

We must, first, educate the people of America to recognize the real, present and growing threat of overpopulation. Second, set an example for the world and stop our own population growth here in the U.S. This will require zero net immigration and significant reductions in fertility. When we do this, we will be on the moral high ground from which we can urge other countries to follow our example and stop their population growth. Third, through extensive voluntary domestic and global family planning programs, we must do our best to make certain that in the U.S. and throughout the world, "Every child is a wanted child."

If we are to bequeath anything to our children, let it be a United States population that is declining in size toward sustainability and which is supported by the use of renewable resources. Let us be a nation that is in equilibrium with our natural environment. Among other things this will require that we make enormous increases in the efficiency with which we use resources. Let us not continue the destruction of our democracy by increasing our overpopulation. Let us be a democracy at peace. Let us respect our Constitution. Let us respect law and order and our fellow human beings.

Population growth, driven by immigration, is moving the United States away from all of these goals. It is time for the United States to adopt goals of zero net immigration and a long period of below-replacement fertility. ■

Acknowledgements

This text was developed from a presentation given at a Seminar on Immigration conducted by the Alumni College of the University of Colorado at Boulder, June 15-16, 2007. I wish to thank Professor Robert Schulzinger of the Department of History of the University of Colorado at Boulder for arranging this Alumni College and for giving me the opportunity to share with the college participants my ideas on the crucial topic of immigration.

Endnotes

1. Twain, Mark, *The Man That Corrupted Hadleyburg, and Other Short Works*, Prometheus Books, Amherst, NY, (2002), Pg. 159.
 - a. See also, Bartlett, A.A., "Thoughts on LongTerm Energy Supplies: Scientists and the Silent Lie," *Physics Today*, July 2004, Pgs. 5355.
 - b. Letters to the Editor commenting on my article, (a) above, and my responses to these letters appear in the November 2004 issue of *Physics Today*, Pgs. 1218, and in February 2005, Pgs. 1215.
2. Bartlett, A.A., "Forgotten Fundamentals of the Energy Crisis," *American Journal of Physics*, Vol. 46, September 1978, Pgs. 876-888.
3. Bartlett, A.A., "Reflections on Sustainability, Population Growth and the Environment," *Population & Environment*, Vol. 16, No. 1, September 1994, Pgs. 535.
 - a. This paper was reprinted in *Renewable Resources Journal*, Vol. 15, No. 4, Winter 1997-98, Pgs. 623.
 - b. The paper was reprinted in the anthology, *Getting to the Source — Readings on Sustainable Values*, edited by William Ross McCluney, SunPine Press, Cape Canaveral, FL, 2004, Pgs. 265205.
 - c. Most recently, revised and shortened, the paper was reprinted in the anthology, *The Future of Sustainability*, edited by Marco Keiner, Springer, Dordrecht, The Netherlands, 2006, Pgs. 1737.
4. M. Wackernagel, W. Rees, *Our Ecological Footprint: Reducing Human Impact on the Earth*, New Society Publishers, Gabriola Island, British Columbia, 1996.
5. Pimentel, D. Private Communication.
6. Bartlett, A.A., "Is there a Population Problem?" *Wild Earth*, Vol. 7, No. 3, Fall 1997, Pgs. 8890.
7. Bartlett, A.A., "Malthus Marginalized: The Massive Movement to Marginalize the Man's Message," *The Social Contract*, Vol. 8, No. 3, Spring 1998, Pgs. 239251.
8. Center for Immigration Studies, Washington, D.C., August 30, 2007, "100 Million More: Projecting the Impact of Immigration on the U.S. Population, 2007 to 2060." <http://CIS.ORG>
9. Beck, Roy, *Immigration by the Numbers*, NumbersUSA,
 - a. NumbersInfo@NumbersUSA.COM
 - b. 1601 Kent Street, Suite 1100, Arlington, VA 22209
10. Bartlett, A.A., "An Analysis of U.S. and World Oil Production Patterns Using Hubbert-Style Curves," *Mathematical Geology*, Vol.32, No. 1, January 2000, Pgs. 117.
11. Bartlett, A.A., Lytwak, E., "Zero Growth of the Population of the United States," *Population and Environment*, Vol. 16, May 1995, Pgs. 415-428.
12. Alister Doyle, "China Says OneChild Policy Helps Protect Climate." Reuters, August 30, 2007.
13. E. Fodor, *Better, Not Bigger*, New Society Publishers Gabriola Island, British Columbia, 1999.
14. Asimov, Isaac, in Moyers, Bill, *A World of Ideas: Conversations with Thoughtful Men and Women About American Life Today*, Doubleday, NYC, 1989.
15. Rapiere, Robert, August 31, 2007 <http://www.energyandcapital.com/articles/print.php?410>
16. Sevareid, Eric, CBS News, 29 December 1970. Quoted in Martin, T.L., *Malice in Blunderland*, McGrawHill Book Co., New York City, 1973.
17. Meadows, D.H., Meadows, D.L., Randers, J., Behrens, W.W., *Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*, Universe Books, New York City, 1972. Updates of this book were published in 1992 and 2002.
18. Richard Heinberg, *Peak Everything*, New Society Publishers, Gabriola Island, B.C., Canada, 2007.

© 2007 by Albert A. Bartlett. Permission to reprint is granted in advance. Please acknowledge source and author, and notify NPG. The views expressed by the author do not necessarily reflect those of NPG.

About the author: Albert A. Bartlett, Professor Emeritus of Physics at the University of Colorado in Boulder, joined the faculty in 1950. For years he was an activist in educating the public about the arithmetic and consequences of the steady growth that is the centerpiece of the U.S. and global economies. He focused on the effects of population growth and growth in the rates of consumption of resources. He first gave the evolving talk that now has the title "Sustainability 101: Arithmetic, Population, and Energy" in September 1969, and as of November 2007 he had given the talk over 1,600 times in the U.S., Canada, Mexico, and overseas. He was a member of the Board of Advisors of Negative Population Growth for many years. Prof. Bartlett died September 7, 2013.