

# QUAKER ECO-BULLETIN

Information and Action Addressing Public Policy  
for an Ecologically Sustainable World

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## Population Issues and Challenges in the 21st Century

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*"The problems of the transition from rapidly growing systems to more or less stationary ones are also very general... The character of a system frequently has to change, not merely because it gets big, but because it stops growing."*

—Kenneth Boulding<sup>1</sup>

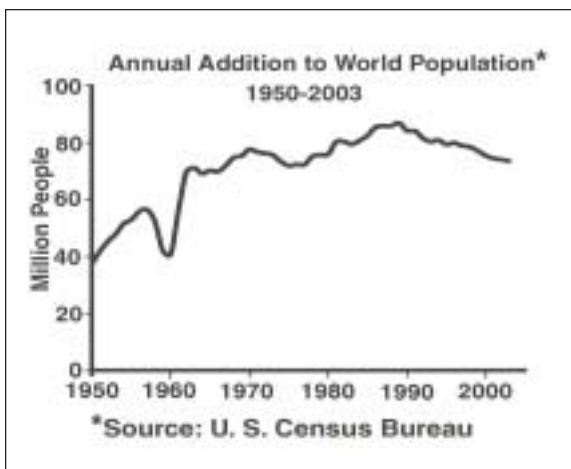
Friends have long been concerned about enhancing the quality of life of every person and of making the world a place where all people and species have opportunities now and in the future. Friends have valued simplicity as a way of life to bring about sustainability on our earth. Sustainability requires that we use the earth's resources at a level that provides a reasonable life for all now and maintains the capacity to provide such a life for all coming generations. An existing population must not use up resources—the natural capital—needed to sustain human and other life in the future.

As we enter the 21st century, the human population—its rate of growth, total size, and distribution over the earth and the relative size of important age groups—continues to challenge our thinking about how to achieve a sustainable world. The threat of a population "bomb," i.e., exponential population growth, has given way to the reality of gradually declining rates of growth in many countries, bringing both opportunities and difficulties of an aging population. International migration, rising mortality rates due to AIDS, sluggish economies, worsening environmental threats, and the great disparity between rates of consumption in developed versus developing countries add to the complexity of contemporary population issues and challenges.

During the 20th century, world population grew from 1.6 billion in 1900 to 2.5 billion in 1950 to 6.1 billion by 2000. Most of this growth came after World War II when health programs and economic development considerably reduced deaths worldwide. The maximum population growth of over two percent per year was reached in the early 1960s. In the late 1980s population growth reached its peak with 87 million persons added to the earth's population each year. Now, in 2004, the earth's population is growing with 75 million additional persons each year.

### Population Growth, Fertility, and Mortality

In the early 2000s, professional demographers are reaching a consensus that world population growth is likely to stop sometime in this century, but by the time it does stop there will be 50 percent more people than today. Demographers at the International Institute for applied Systems Analysis in Austria predicted, as their book title indicates, *The End of World Population Growth in the 21st Century: New Challenges for Human Capital Formation and Sustainable Development*. Likewise, United Nations demographers also project population growth likely reaching 9.2 billion in 2075 up from 6.1 billion in 2000, and falling to 9.1 billion in 2100 (according to their medium scenario). Such projections are fraught with uncertainties, as shown by the UN's low projection of 5.5 billion in 2100 and their high projection of 14.0 billion in 2100. While the cessation of population growth is far from inevitable, continued rapid population growth no longer poses the threat that many previously feared.



Even if we accept that population growth will cease in this century, adding another three billion persons (or 50 percent) to the world's population is a **formidable** outcome. What is the carrying capacity of the earth, that is, how many people can it support? Estimates vary depending upon the assumptions made, especially in regard to the lifestyles of the various human populations. This is a subject for a future *Quaker Eco-Bulletin*.

All of the projected population growth is likely to be in less developed regions, which have the greatest poverty and, therefore, the greatest need. According to the UN's medium projections, population in less developed regions

is expected to grow from 4.9 billion in 2000 to 7.9 billion in 2100, while population in more developed regions (Europe, North America, Australia, New Zealand, and Japan) is expected to drop from 1.2 billion in 2000 to 1.1 billion in 2100.

<sup>1</sup>Kenneth Boulding. 1970. "Toward a General Theory of Growth" in *Beyond Economics: Essays on Society, Religion and Ethics*. Ann Arbor, Michigan: Ann Arbor Paperbacks, p. 81.

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**QEW-NL** promotes government and corporate policies to help restore and protect Earth's biological integrity. It works within and through the Religious Society of Friends for policies that enable human communities to relate in mutually enhancing ways to the ecosystems of which they are a part. This witness seeks to be guided by the Spirit and grounded in reverence for God's creation.

**QEB's** purpose is to advance Friends' witness on government and corporate policy as it relates to the ecosystems that sustain us. Each issue is an article about timely legislative or corporate policy issues affecting our society's relationship to the earth.

Friends are invited to contact us about writing an article for **QEB**. Submissions are subject to editing and should:

- Provide background information that reflects the complexity of the issue and is respectful toward other points of view.
- Explain why the issue is a Friends' concern.
- Describe the positions of other faith-based and secular environmental groups on the issue.
- Relate the issue to legislation or corporate policy.
- List what Friends can do.
- Provide sources for additional information.

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The average number of children born to a woman if current age-specific fertility rates remained constant (the total fertility rate) is expected to stay below replacement (2.1 children per woman) throughout this century in many European countries.

Previously, demographers had expected fertility to increase to replacement level in most European countries. This change in fertility expectations has significant implications for the population of European countries with more deaths than births, pressures of immigration for labor, and aging. If zero population growth is desirable, European countries are a model, for better or for worse.

Unlike Europe, the United States and Canada are expected to keep growing considerably in this century: the United States from 285 million in 2000 to 437 million and Canada from 31 million in 2000 to 37 million in 2100, according to the UN's medium projections.

While mortality will likely continue to improve in the 21<sup>st</sup> century, some countries will be severely affected by epidemics. AIDS has already killed an estimated 20 million people, and 40 million people living with HIV/AIDS may die within the next decade. Countries in sub-Saharan Africa, such as Botswana, Zimbabwe, Namibia, Mozambique, and South Africa, are hardest hit by AIDS now, but other countries, such as India and China, are seeing increases in the number of persons affected by the disease. While mortality due to AIDS has slowed population growth in some countries, significant population growth still continues. It is impossible to guess what will be the impact of AIDS and other diseases due to environmental stress, energy shortages, and population pressures, but young people and the elderly are likely to be affected more than others.

### **International Migration**

**I**nternational migration affects many countries and is a major factor in population in some countries today. About 175 million people—three percent of the world population—are estimated to be international migrants, that is, they live in a country other than that of their birth or citizenship. Perhaps five to ten million are temporary migrants, moving back and forth. Most of these migrants move from developing countries to developed countries, although there are also movements between countries within Asia, South America, or Africa.

While many European countries have modest immigration (mainly from Africa and Asia), in the United States immigration contributes significantly to its population growth. Legal immigration to the United States is around one million persons per year (1,063,732 in 2002) and illegal immigration contributes even more persons. Of these legal immigrants, about 43 percent were from Mexico, Central America, South America, and the Caribbean in 2002. Most of these migrants are of Hispanic Origin, the group which has the highest fertility of any race-ethnic group in the United States.

Immigrants often have lower fertility than non-immigrants in the country from which they come. Also, immigrants often contribute to higher population growth in the country to which they go. Worldwide, however, immigration helps lower fertility and, thus, population growth. Also, because immigrants are usually younger, often much younger, than the native population in the country to which they immigrate, immigration today acts to make a receiving country's population younger than it would be without immigration.

### **Impact on Resource Use and Sustainability**

**A**lthough population growth appears to be going down worldwide, even further slowing population growth will be a very important factor in reducing resource use and in reaching a sustainable society. The familiar relationship of population to sustainability at a given time is:

$$I = P \times A \times T$$

where for a given good or activity,

I = Impact on the environment for that good or activity,

P = Population in absolute size,

A = Affluence per person, and

T = Technology used at a given level of affluence.

Since some of these terms are vague for a specific good, resource, or activity, A and T can be combined as the level of a good per person, C (for per *capita*), that is,

$$C = A \times T$$

Thus, directly, C equals the amount of a resource per *capita*. If R, the amount of a resource being used, (such as, water, food, mineral, energy, or income used, or pollution produced), is used instead of I (Impact), the formula can then be restated as:

$$R = P \times C.$$

Table 1 shows this relationship with data about grain production in the world. The years, 1961, 1985 and 2002, illustrate the impact of population on how much grain was produced worldwide per person. The year 1985 was chosen because the highest amount of grain per person was produced in that year of all the years between 1961 and 2002. Even though the total amount of grain produced in the world increased from 1961 to 2002, the amount per person went down from 1985 to 2002, because the population of the world also increased.

**Table 1: World Grain Production**

Year	Production <sup>1</sup>	Population <sup>2</sup>	Grain per person <sup>3</sup>
1961	805	3.08	261
1985	1,665	4.85	343
2002	1,883	6.41	294

<sup>1</sup>Grain production in billions of kilograms from the U.S. Dept. of Agriculture. Data for 2002 is preliminary.

<sup>2</sup>World population in billions from the U.S. Census Bureau

<sup>3</sup>Grain per person on earth in kilograms

**Source:** Worldwatch Institute. 2003, *Vital Signs: 2003*. New York, NY: W.W. Norton & Company. p. 29.

It follows that with a limited *and, therefore, sustainable* use of a resource such as food, with everything else being equal, the lower the population, the higher the amount per person. Of course, everything else is not equal, and population size does affect labor and demand. In general, however, we will more easily reach a sustainable use of a resource with a smaller population than with a larger population.

This relationship can be restated in terms of *growth rates* expressed as the percent change per year between two time periods.

$$r_R = r_P + r_C,$$

where  $r_R$  = rate of growth of a resource overall,

$r_P$  = rate of growth of population,

and  $r_C$  = rate of growth of per capita use of a resource.

The same data as in Table 1, using two time periods, 1961 to 1985 and 1985 to 2002, illustrate different trends in the impact of population growth on how much grain per person worldwide changed. As Table 2 shows, between 1961 and 1985, the amount of grain worldwide increased rather significantly at 3.03 percent per year due to the green revolution, more land for agriculture, and more water and energy inputs. Thus, a person had on average 1.14 percent more grain to eat each year *despite* a population growth in the 1960s, 1970s, and early 1980s of 1.89 percent per year.

From 1985 to 2002, however, overall average grain production growth per year declined to 0.57 percent and the grain production growth per person *decreased* by 0.90 percent per year. While the rate of population growth also went down to 1.47 percent per year during that time, the population grew faster than grain production. Population growth at the end of the 20<sup>th</sup> century outpaced improvements in grain production. If population had not been growing, the amount of grain per person might well have increased, since less total grain would have been needed. At least, the energy, water, pesticides, and fertilizers would have been less in order to maintain the same amount of grain per person. With no population growth, we would have been closer to a sustainable world.

### Challenges of a No-Growth Population

**A**lthough population is still growing rapidly worldwide, a slowing of population growth and even a possible decline seems likely in this century. Populations in many European countries are currently declining and

Japan has almost stopped growing. One implication is that all populations will get older. For instance, in 2000, European countries had a median age of about 39, United States 35, and Mexico 23. Unless mortality increases, the age of these populations will increase, all reaching a median age of around 50. This aging is an *inevitable* consequence of populations which are not growing or growing slowly.

Such aging of population has raised concerns about the consequences of slower population growth and decline. Will there be sufficient capable workers and caretakers? Since communities with declining populations are often associated with poverty, would not economic stagnation result? Could a country afford pensions and health care to the growing number of retirees, especially if the pensions were paid by current workers, as is the case with Social Security in the United States?

Populations have many ways they can adapt to such challenges. Societies have already made adjustments to *declining* depen-

**Table 2: Growth of World Grain Production**

Period	Production <sup>1</sup>	Population <sup>2</sup>	Grain per person <sup>3</sup>
1961-1985	3.03	1.89	1.14
1985-2002 <sup>4</sup>	0.57	1.47	-0.90

<sup>1</sup>Rate of growth of grain production in average percent per year

<sup>2</sup>Rate of growth of world population in average percent per year

<sup>3</sup>Rate of growth of grain per person on earth in average percent per year

<sup>4</sup>Data for 2002 is preliminary

**Source:** Worldwatch Institute. 2003, *Vital Signs: 2003*. New York, NY: W.W. Norton & Company. p. 29.



**Table 3: Dependency Ratios**

Year	Youth <sup>1</sup>	Elderly <sup>2</sup>	Total <sup>3</sup>
1880	65	6	71
1940	37	10	47
2020	31	26	57

<sup>1</sup>Youth Dependency ratio (youth aged 0-14 years per 100 persons ages 15-64)

<sup>2</sup>Elderly Dependency ratio (elderly aged 65 and above per 100 persons aged 15-64)

<sup>3</sup>Total Dependency Ratio (Youth plus Elderly Dependency Ratio)

**Source:** U.S. Bureau of the Census

dependency ratios (the ratio of the number of persons under the age of 15 plus the number of persons over the age of 65 to the number of persons in the working population aged 15 to 64 expressed per 100 persons) as the proportion of children has declined as fertility has gone down. As Table 3 shows, the dependency ratio in the United States went down from 71 in 1880 to 47 in 1940, due to decreasing fertility. The dependency ratio then increased to 51 in 2000 and will possibly increase to 57 in 2020 with a greater proportion of elderly. Even with an aging population, the United States still will not have as great a dependency ratio in the future as it had in the 19th century.

Raising the age of retirement by one year would reduce the ratio of pensioners to workers in a typical developed country by an estimated six percent in 50 years. Pension benefits could be moderately reduced (with the resulting lower consumption) without disrupting the economy of a country. Immigration could help keep a population younger for a while, although this is not a permanent solution; the immigrants will eventually age and the numbers of immigrants needed to keep the population young is considerable. Social arrangements supporting childbearing and opportunities for women would likely increase fertility. In many ways, however, a smaller population with cities and rural areas focused on adequate transportation, housing, and community facilities for older persons might bring about a better life for all of us and give us opportunities to adjust to an aging population.

## Other Organizations

### Concerned about Population

Population Action International, 1300 19<sup>th</sup> St., NW, Washington, DC 20036 <[www.populationaction.org](http://www.populationaction.org)>  
Population Connection, 1400 16<sup>th</sup> St. NW, Suite 320, Washington DC 20036 <[www.popconnect.org](http://www.popconnect.org)>  
Population Council, 1 Dag Hammarskjöld Plaza, New York, NY 10017 <[www.popcouncil.org](http://www.popcouncil.org)>  
Population Reference Bureau, 1875 Connecticut Ave., NW, Suite 520, Washington, D.C. 20009-5728 <[www.prb.org](http://www.prb.org)>  
Population Institute, 107 Second St., NE, Washington, DC 20002 <[www.popinstitute.org](http://www.popinstitute.org)>  
United Nations Fund for Population Activities, 220 East 42<sup>nd</sup> St., New York, NY 10017 <[www.unfpa.org](http://www.unfpa.org)>  
Worldwatch Institute, 1776 Massachusetts Ave., NW, Washington, DC 20036 <[www.worldwatch.org](http://www.worldwatch.org)>

### For Further Information

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## What Can Friends Do?

1) To slow population growth and give couples a chance to make fertility choices, support political efforts for the United States to:

- restore full funding to the United Nations Fund for Population Activities,
- restore Federal support of availability of family planning in clinics and pharmacies, and
- encourage insurance to cover family planning.

2) Consider the number of children each of us has and encourage the option of adoption.

3) For immigration policies, support Federal and state policies for immigration reform and fairness toward immigrants in a receiving country.

4) To make non-growing, aging societies a better place to live, support policies to help elderly be productive and healthy and develop livable, less costly communities for all.

5) Support other organizations concerned about population.