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By Joel E. Cohen

ONE week from today, the United Nations estimates, the world's population will reach seven billion. Because censuses are infrequent and incomplete, no one knows the precise date — the Census Bureau puts it somewhere next March — but there can be no doubt that humanity is approaching a milestone.

The first billion people accumulated over a leisurely interval, from the origins of humans hundreds of thousands of years ago to the early 1800s. Adding the second took another 120 or so years. Then, in the last 50 years, humanity more than doubled, surging from three billion in 1959 to four billion in 1974, five billion in 1987 and six billion in 1998. This rate of population increase has no historical precedent.

Can the earth support seven billion now, and the three billion people who are expected to be added by the end of this century? Are the enormous increases in households, cities, material consumption and waste compatible with dignity, health, environmental quality and freedom from poverty?

For some in the West, the greatest challenge — because it is the least visible — is to shake off, at last, the view that large and growing numbers of people represent power and prosperity.

This view was fostered over millennia, by the pronatalism of the Hebrew Bible, the Roman Empire, the Roman Catholic Church and Arab thinkers like Ibn Khaldun. Mercantilists of the 16th through the 18th centuries saw a growing population as increasing national wealth: more workers, more consumers, more soldiers. Enlarging the workforce depressed wages, increasing the economic surplus available to the king. "The number of the people makes the wealth of states," said Frederick the Great.

In the late 19th and early 20th centuries, pronatalism acquired a specious scientific aura from social Darwinism and eugenics. Even today, some economists argue, incorrectly, that population growth is required for economic growth and that Africa is underpopulated.

This view made some sense for societies subject to catastrophic mortality from famines, plagues and wars. But it has outlived its usefulness now that human consumption, and pollution, loom large across the earth.

Today, while many people reject the equation of human numbers with power,

it remains unpalatable, if not suicidal, for political leaders to admit that the United States and Europe do not need growing populations to prosper and be influential and that rich countries should reduce their rates of unintended pregnancy and help poor countries do likewise. With the globalization of work, the incentive for owners of capital today to ignore or not address rapid growth in the numbers of poor people remains as it was for the kings of yore: lower wages for workers at any level of skill offer a bigger economic surplus to be captured.

But just as pronatalism is unjustified, so are the dire — and discredited — prophecies of Thomas Malthus and his followers, who believed that soaring populations must lead to mass starvation.

In fact, the world is physically capable of feeding, sheltering and enriching many more people in the short term. Between 1820, at the dawn of the industrial age, and 2008, when the world economy entered recession, economic output per person increased elevenfold.

Life expectancy tripled in the last few thousand years, to a global average of nearly 70 years. The average number of children per woman fell worldwide to

Can humanity handle the unprecedented rise in population?

about 2.5 now from 5 in 1950. The world's population is growing at 1.1 percent per year, half the peak rate in the 1960s. The slowing growth rate enables families and societies to focus on the well-being of their children rather than the quantity.

Nearly two-thirds of women under 50 who are married or in a union use some form of contraception, which saves the lives of mothers who would otherwise die in childbirth and avoids millions of abortions each year — an achievement that people who oppose and people who support the availability of legal abortions can both celebrate.

But there is plenty of bad news, too. Nearly half the world lives on \$2 a day, or less. In China, the figure is 36 percent; in India, 76 percent. More than 800 million people live in slums. A similar number, mostly women, are illiterate.

Some 850 million to 925 million people experience food insecurity or chronic undernourishment. In much of Africa and South Asia, more than half the children are stunted (of low height for their age) as a result of chronic hunger. While the world produced 2.3 billion metric tons of cereal grains in 2009-10 — enough calories to sustain 9 to 11 billion people — only 46 percent of the grain went into human mouths. Domestic animals got 34 percent of the crop, and 19 percent went to industrial uses like biofuels, starches and plastics.

Of the 208 million pregnancies in 2008, about 86 million were unintended, and they resulted in 33 million unplanned births. And unintended births are not the

whole problem. Contraceptives have been free since 2002 in Niger, where the total fertility rate — more than seven children per woman in mid-2010 — was the world's highest. Women in Niger marry at a median age of 15.5, and married women and men reported in 2006 that they wanted an average of 8.8 and 12.6 children, respectively.

Human demands on the earth have grown enormously, though the atmosphere, the oceans and the continents are no bigger now than they were when humans evolved. Already, more than a billion people live without an adequate, renewable supply of fresh water.

About two-thirds of fresh water is used for agriculture. Over the coming half century, as incomes rise, people will try to buy agricultural products that require more water. Cities and industries will demand more than three times as much water in developing countries. Watershed managers will increasingly want to limit water diversion from rivers to maintain flood plains, permit fish to migrate, recycle organic matter and maintain water quality.

Water shortages are projected to be significant in northern Africa, India, China, parts of Europe, eastern Australia, the western United States and elsewhere. Climate changes will increase the water available for agriculture in North America and Asia but decrease it in Africa, Latin America and the Caribbean. Similar stories could be told about land, overfishing and carbon and nitrogen emissions to the atmosphere.

Where is this taking us? The coming half century will see huge shifts in the geopolitical balance of numbers, further declines in the number of children per woman, smaller but more numerous households, an increasingly elderly population, and growing and more numerous cities.

The United Nations Population Division anticipates 8 billion people by 2025, 9 billion by 2043 and 10 billion by 2083. India will have more people than China shortly after 2020, and sub-Saharan Africa will have more people than India before 2040.

In 1950, there were nearly three times as many Europeans as sub-Saharan Africans. By 2010, there were 16 percent more sub-Saharan Africans than Europeans. By 2100, according to the Population Division, there will be nearly five sub-Saharan Africans for every European.

In some ways, the growth in the numbers of people matters less than the growth in the numbers of households. If each household has its own refrigerator, air-conditioner, TV and car, the average energy demand for a given number of people goes up as the average number of people in a household goes down.

The urban population of developing countries is expected to grow by a million people every five days through at least 2030, while the rural population falls. Many cities will eat into prime agricultural land unless they grow in density, not extent. And nearly half of urban population growth by 2015 will occur in cities of fewer than half a million people.

The coming revolution in aging is well under way in the more developed countries. It will go global in the next half cen-

ture. In 1950, for each person 65 and older, there were more than six children under 15. By 2070, elderly people will outnumber children under 15, and there will be only three people of working age (15 to 64) for every two people under 15 or 65 and older. Pressures to extend the "working age" beyond 65 will grow more intense.

Is economic development the best contraception? Or is voluntary contraception the best form of development? Does the world need a bigger pie (more productive technologies) or fewer forks (slower population growth through voluntary contraception) or better manners (fewer inequities, less violence and corruption, freer trade and mobility, more rule of law, less material-intensive consumption)? Or is education of better quality and greater availability a key ingredient of all other strategies?

All these approaches have value. However much we would like one, there is no panacea, though some priorities are clear: voluntary contraception and support services, universal primary and secondary education, and food for pregnant and lactating mothers and children under 5.

These priorities are mutually reinforcing, and they are affordable. Providing modern family planning methods to all people with unmet needs would cost about \$6.7 billion a year, slightly less than the \$6.9 billion Americans are expected to spend for Halloween this year. By one estimate, achieving universal primary and secondary education by 2015 would cost anywhere from \$35 billion to \$70 billion in additional spending per year.

IF we spend our wealth — our material, environmental, human and financial capital — faster than we increase it by savings and investment, we will shift the costs of the prosperity that some enjoy today onto future generations. The mismatch between the short-term incentives that guide our political and economic institutions and even our families, on one hand, and our long-term aspirations, on the other, is severe.

We must increase the probability that every child born will be wanted and well cared for and have decent prospects for a good life. We must conserve more, and more wisely use, the energy, water, land, materials and biological diversity with which we are blessed.

Henceforth we need to measure our growth in prosperity: not by the sheer number of people who inhabit the earth, and not by flawed measurements like G.D.P., but by how well we satisfy basic human needs; by how well we foster dignity, creativity, community and cooperation; by how well we care for our biological and physical environment, our only home. □