nurture other and more precious freedoms is by relinquishing the freedom to breed, and that very soon. . . . Only so, can we put an end to this aspect of the tragedy of the commons.”

Not everyone will agree with the ethics of Hardin’s arguments (see also Hardin 1993). Indeed, the freedom to procreate is a major unregulated decision, and few choices are more intensely personal, valued, or intimately tied to the social and cultural fabric of a society than those that free people make about marriage and family. Some regard the freedom to parent as a human right. Others claim that controls on family size are unnecessary because the ultimate carrying capacity of the global ecosystem is unknown and the impact of unregulated population growth on social well-being and environmental quality remains unclear. For this reason, politics governs debates about population policies. To understand why this issue has become so controversial, it is helpful to trace the global trends in population growth that have made the topic so problematic.

ASSESSING GLOBAL DEMOGRAPHIC TRENDS

The dramatic growth in world population in the twentieth century was historically unprecedented. It took 2 million years for the world population to reach 1 billion in 1804, but only until 1927 to reach 2 billion. Since then, additional billions have been added even more rapidly: 3 billion was reached by 1960, 4 billion in 1974, and 5 billion in 1987 (see Figure 10.1). The sixth billionth human arrived on the eve of the twenty-first century. How is this series of ever larger, increases possible? Because world population grows by nearly ten thousand each hour of every day and is increasing at a record pace; “we add a New York city every month, almost a Mexico every year, almost an India every decade” (Mckibben 1998, 56). If present trends continue uninterrupted, world population will grow to 7.5 billion in 2015, hit 9.8 billion in 2050, and reach 10 billion only a few years later—about the time most of today’s college students will be drawing retirement benefits. Indeed, most students reading this book will have witnessed the largest population surge ever to have occurred in a single generation—theirs.

As difficult as it may be to imagine a world with half again as many people as today, 10 billion is less than what was once projected for the middle of the twenty-first century. The latest projection—what the United Nations (UN) calls its “medium variant” (the middle line among the three population projections in Figure 10.1)—depends on the assumption that the world fertility rate will continue to decline, as it has for more than a decade, and will eventually settle at a point where couples only replace themselves. Without that, population growth could be much more rapid in the first half of the twenty-first century, reaching 11.9 billion in the year 2050 (the top line in Figure 10.1), nearly five times the 1950 population. In either case, world population will continue to grow throughout the twenty-first century and into the twenty-second. On the other hand, should birthrates slow more rapidly, world population would also grow more slowly and eventually settle at a level much lower than now seems most likely (the bottom line in Figure 10.1).
Understanding Growth Rates: The Persian Chessboard

The rapid growth of world population since 1927 is described by a simple mathematical principle articulated in 1798 by the Reverend Thomas Malthus: unchecked, population increases in a geometric or exponential ratio (e.g., 1 to 2, 2 to 4, 4 to 8, etc.), whereas subsistence increases in only an arithmetic ratio (1 to 2, 2 to 3, 3 to 4). When population increases at such a geometric rate, the acceleration can be staggering. Carl Sagan provides a telling illustration of this principle governing growth rates with a parable he termed “The Secret of the Persian Chessboard”:

The way I first heard the story, it happened in ancient Persia. But it may have been India, or even China. Anyway, it happened a long time ago. The Grand Vizier, the principal adviser to the King, had invented a new game. It was played with moving pieces on a board of 64 squares. The most important piece was the King. The next most important piece was the Grand Vizier—just what we might expect of a game invented by a Grand Vizier. The object of the game was to capture the enemy King, and so the game was called, in Persian, shahmat—shah for king, mat for dead. Death to the King. In Russia it is still called shakhmaty, which perhaps conveys a lingering revolutionary ardor. Even in English there is an echo of the name—the final move is called “checkmate.” The game, of course, is chess.
As time passed, the pieces, their moves and the rules evolved. There is, for example, no longer a piece called the Grand Vizier—it has become transmogrified into a Queen, with much more formidable powers.

Why a king should delight in the creation of a game called “Death to the King” is a mystery. But, the story goes, he was so pleased that he asked the Grand Vizier to name his own reward for such a splendid invention. The Grand Vizier had his answer ready: He was a humble man, he told the King. He wished only for a humble reward. Gesturing to the eight columns and eight rows of squares on the board he devised, he asked that he be given a single grain of wheat on the first square, twice that on the second square, twice that on the third, and so on, until each square had its complement of wheat.

No, the King remonstrated. This is too modest a prize for so important an invention. He offered jewels, dancing girls, palaces. But the Grand Vizier, his eyes becomingly lowered, refused them all. It was little piles of wheat he wanted. So, secretly marveling at the unselfishness of his counselor, the King graciously consented.

When the Master of the Royal Granary began to count out the grains, however, the King was in for a rude surprise. The number of grains starts small enough: 1, 2, 4, 8, 32, 64, 128, 256, 512, 1,024. . . . But by the time the 64th square is approached, the number becomes colossal, staggering. In fact the number is nearly 18.5 quintillion grains of wheat. Maybe the Grand Vizier was on a high-fiber diet.

How much does 18.5 quintillion grains of wheat weigh? If each grain were 2 millimeters in size, then all the grains together would weigh around 75 billion metric tons, which far exceeds what could have been stored in the King’s granaries. In fact, this is the equivalent of about 150 years of the world’s present wheat production. (Sagan 1989, 14)

To picture in another way how growth rates unfold, consider how money deposited in a savings account grows as it earns interest not only on the original investment but also on the interest payments. If each of our ancestors had put a mere 10 dollars in the bank for us two hundred years ago, and it accrued a steady 6 percent annual interest, today we would all be millionaires! Population grows in the same way: It is a function of increases in the original number of people plus those accruing from past population growth. Thus a population growing at a 1 percent rate will double in sixty-nine years, while a population growing at a 2 percent rate will double in only thirty-five years. (The impact of different growth rates on doubling times can be calculated by dividing 69 by the percentage of growth.)

The principles that define growth rates explain why “growth is the defining feature of the twentieth century, and has become the de facto organizing principle for societies around the world. Although growth rates have risen and fallen, the total scale of human activity has expanded continually, reaching levels that would have been unimaginable in earlier centuries” (Brown et al. 1999). The story of population growth is told in its statistics: The annual rate of population growth in the twentieth century increased from less than 1 percent in 1900 to a peak of 2.2 percent in 1964. It has since dropped to 1.4 percent since then. Despite the change in rate, however, the absolute number of people added continued to grow, from 16 million in 1900 to a peak of 87 million in 1990. It has
fallen to 80 million new people per year and is expected to remain at that level for another two decades (Brown et al. 1999, 8). These figures tell us that the planet in the twenty-first century will have more people, well beyond the 6 billion already roaming the planet. Yet the feared "population explosion" once believed certain to overwhelm the earth’s resources is now expected to be far less dramatic than once thought by the year 2050.

If a catastrophic population explosion is not necessarily assured and the probability of continuing population growth to overwhelm a crowded planet is receding, why then does population remain such a political powder keg in world politics? The answers are numerous, but several salient features about population dynamics make demographic change the source of new global issues and problems.

The Demographic Divide between Global North and Global South

One key problem has to do with the fact that population growth rates are not the same throughout the world. Population is growing much more rapidly in the developing Global South countries than in the wealthy countries in the Global North, and the differentials are widening because in the next century nearly all the increase will take place in the Global South (mainly in its burgeoning cities) while the population of the industrialized world is actually expected to decline. In fact, population growth figures

... for individual countries vary more than at any time in history. In some thirty-two countries, human numbers have stabilized, while in others they are projected to double or triple. With the exception of Japan, all the countries in the stable group are in Europe. The number of people in a dozen or so countries, including Russia, Japan, and Germany, is actually projected to decline somewhat over the next half-century. In another forty countries, which account for nearly 40 percent of the global total, fertility has dropped to at least replacement level—roughly two children per couple. Among the countries in this category are China and the United States, the world’s first and third most populous nations. In contrast to this group, some developing countries are projected to triple their populations over the next half-century. For example, Ethiopia’s current population of 59 million is due to reach 213 million in 2050, while Pakistan’s 147 million are likely to become 357 million, surpassing the projected population of the United States before 2050. Nigeria, meanwhile, is projected to go from 122 million today to 339 million—more people than in all of Africa in 1950. The largest absolute increase is anticipated for India, which is likely to add nearly 600 million by 2050, eclipsing China as the most populous country. Scores of smaller countries also face potentially overwhelming population growth. (Brown et al. 1999, 8-9)

The globe has become, and will remain, demographically divided as the incremental contributions of the Global South to the globe’s population is responsible for almost all of that increase. “Whereas 79 percent of the annual increase in world population between 1950 and 1955 originated in the less developed regions, 95 percent of the increment between 1990 and 1995 originated in those regions. It is expected that by 2045–2050 all the net population growth in the world will arise in the less developed regions, as the population of
the more developed regions is expected to be declining in absolute numbers” (United Nations 1995a, 147). This “demographic divide,” as projected in Figure 10.2, explains a large part of the problem making population such a hot political issue.

Because population growth is occurring in precisely those countries least able to support a growing number of people, the high fertility rate in the developing world means that global population cannot be expected to stabilize until it falls below replacement-level fertility. In 1999, the worldwide average number of children born to a woman during her lifetime—the total fertility rate—was around 3.0, at which rate the world population would double in forty-seven years. However, “these global summaries disguise two different worlds: the rich and the poor” (Cohen 1998). Although the world’s population added 78 million people in 1998 (equal to another Germany), “nearly all of these people were added in the developing countries, already home to 4.85 billion people—more than 80 percent of the world” (Vital Signs 1999, 98). Hence, global population growth is the result of new births in the developing Global South, where the average fertility rate was on average 3.4 children for each mother, in contrast to the wealthy developed Global North where the fertility rate has actually declined to 1.6 children for each woman, which is below replacement-level fertility (each couple replacing itself with two children).

These numbers are sharply lower than in the 1960s and 1970s, thus helping to slow the rate of global population growth to its present level. Still, “world population can be stable only if fertility rates around the world average out to 2.1 children per woman” to fall to replacement level (Singer 1999). Yet throughout much of the Global South, the preferred family size remains far in excess not only of the replacement level but also of the present world fertility rate of about 3 percent. Among the world’s largest states, for example, China is the only Global South country that has achieved the replacement plateau. The numbers are especially startling in sub-Saharan African states such as Nigeria, where the region’s fertility rate stood at 6.2 in 1995.

The developing countries’ high fertility rates have important economic consequences. Those higher rates in the Global South combined with the sheer number of children already born are largely responsible for the fact that fraticious differences in wealth between the Global South and the Global North are likely to widen. Almost all the problems in the North-South dispute can be traced to these stark differences in wealth, and the disparities in income and economic growth are directly linked to the differentials in population growth rate. A brief look at these dynamics completes the picture underlying the global problem of ongoing political conflict between the haves and the have-nots.

Population Momentum

The surge in the Global South’s population in the twentieth century is easily explained as a combination of high birthrates and rapidly falling death rates. But to understand the population surge projected throughout the twenty-first century—when birth rates throughout the world will decline—we have to understand the force of population momentum, the continued growth of population for decades into the future because of the large numbers of women now entering their childbearing years. Like the inertia of a descending airliner when it first touches down on the runway, population growth simply cannot be halted.
even with an immediate, full application of the brakes. Instead, many years of high fertility mean that more women will be entering their reproductive years than in the past. Not until the size of the generation giving birth to children is no larger than the generation among which deaths are occurring will the population “airplane” come to a halt.

The impact of the existing base population on future growth was made evident in 1998. That year, world population increased even though the rate of growth had fallen to 1.4 percent from the record high of 2.2 percent in 1964: the 2.2 percent growth rate in 1964 added 69 million more people, but the 1.4 percent growth rate in 1998 added 78 million people, swelling the global total to 5.92 billion (Vital Signs 1999, 98). Hence, the momentum created by the past population base limits the significance of a declining growth rate.

Western Europe and Sub-Saharan Africa also illustrate the force of population momentum. Africa’s demographic profile is one of rapid population growth, as each new age group (cohort) contains more people than the one before it. Thus, even if individual African couples choose to have fewer children than their parents, Africa’s population will continue to grow because there are now more men and women of childbearing age than ever before. In contrast, Europe’s population profile is one of slow growth, as recent cohorts have been smaller than preceding ones. In fact, Europe has moved beyond replacement-level fertility to become a “declining” population, described by low birthrates and a growing number of people who survive middle age. A product of an extended period of low birthrates, low death rates, and increased longevity, Europe’s age structure is best described as that of a “mature” or “old” society, where the low birthrates and aging populations have caused alarms that “there are too few newborns in Europe to renew populations” (Spector 1998).

As the Global North generally ages, much of the Global South continues to mirror the Sub-Saharan African profile. Because each cohort is typically larger than the one before it, the number of young men and women entering their
reproductive years will also continue to grow. The consequences of the Global South's now proportionately larger fertile age groups is why the demographic momentum already in place will produce quite different population profiles in the developed and the developing worlds.

A Demographic Transition?

High rates of population growth are, simply put, punitive and painful. "Rapid population growth in low-income countries condemns those countries to underdevelopment and poverty. . . . Where populations have grown most rapidly, economies have done the worst" (Sinding 1999). How can the poor Global South escape the population explosion that in many developing countries is blocking their economic development?

One path out of this economic prison is to engineer population reductions by following the path known as demographic transition. That term was coined to describe the change that Europe and, later, North America experienced between 1750 and 1930, when high birthrates combined with high death rates was replaced by low birthrates and low death rates. The transition started when death rates began to fall—presumably due to economic growth, rising living standards, and improved disease control. Although the potential for substantial population growth was high, birthrates soon began to decline as well. During this phase of the demographic transition, the rate of population growth slowed. In fact, growth rates rarely exceeded 1.5 percent per year.

Demographic transition is now under way virtually everywhere in the world (Lutz 1994), but at much different rates in different countries and regions. With the exception of about twenty-five states now at near-replacement levels, the experience of the Global South differs greatly from that of Europe and North America, where death rates declined slowly. In most of the Global South, death rates have declined rapidly, largely as a result of more effective "death-control" measures introduced by the outside world. A population explosion inevitably followed.

The experience of the Indian Ocean island of Mauritius illustrates the interplay of changing birth and death rates as underlying long-term factors in demographic transitions. Following the eradication of malaria and the introduction of modern medical technology after World War II, the death rate dropped abruptly; however, birthrates remained high, and the population of Mauritius grew rapidly. It was not until much later when the fertility rate fell that the average number of children born to each woman declined from six to less than three, slowing the growth rate of Mauritius's population. India provides another example of the barriers to slowing the rate at which population increases until the full effects of a demographic transition occur. India's total fertility rate dropped from 4.3 in 1985 to 3.2 in 1996 but because of India's already massive population size, nearly 25 million children were born that year. Despite the drop in fertility, India's population is expected to reach 1.5 billion by 2050 (Vital Signs 1997, 80).

There are two ways that changes in birth and death rates enable demographic transitions to develop. First, a decline in death rates can itself stimulate a decline in birthrates. When people begin to expect to live longer lives, couples begin "to realize that more of their children will live to adulthood, and therefore, to feel secure that they can have fewer births and still achieve their desired number of surviving children" (Lutz 1994). Second, demographic transitions
are a by-product of modernization, which produces value changes about the preferred size of family. In traditional low-income societies children are economic bonuses because they contribute to the family income; as modernization proceeds, they can become economic burdens, inhibiting social mobility and capital accumulation. "In most every country where people have moved from traditional ways of life to modern ones, they are choosing to have too few children to replace themselves." Modernization changes family values and drives fertility rates toward the replacement level; a demographic transition then commences followed by low or no population growth. "As long as people prefer saving effort and money by having fewer children, population will continue to decline" (Singer 1999).

These two paths to demographic transitions are not mutually exclusive. They may in fact be at work simultaneously in much of the Global South, where declines in birth and death rates have often occurred in tandem. Mauritius is again instructive: Its fertility rate fell by half in a single decade "on a strictly voluntary basis—the result of high levels of literacy and education for women—together with successful family-planning programs" (Lutz 1994). Demographic transitions typically involve four phases: (1) high birthrate, high death rate; (2) high birthrate, falling death rate; (3) declining birthrate, relatively low death rate; (4) low birthrate, low death rate. Yet in such different places as Costa Rica in Central America, Tunisia in North Africa, and Sri Lanka in South Asia, some Global South countries are seemingly stuck between the second and third stages of the transition: Death rates have fallen to very low levels, but fertility rates seem to have stabilized well above replacement level. Does the reason lie in social attitudes toward family size that remain unchanged by modernization—unlike in Europe, North America, or some newly emerging economies (NEIs) in the Global South? Or is it caused by inadequate education and family-planning programs?

In both cases, women's role in society is critical, as are changes that occur in the values that national cultures embrace. Affecting both of these determinants is the political economy of family practice. Economics is probably the most important factor influencing which additional Global South countries will undergo demographic transitions. The level of poverty is a barrier to population control, because in the most impoverished countries children add to a family's labor force and provide future security for parents, especially for those who live in societies that have no public programs for the elderly. When the infant mortality rate is high, the incentives to have many offspring are even greater: The larger the number of children born, the greater the chance that some will survive. Infant and child (under-five) mortality rates have declined dramatically in the past three decades (UNDP 1999), but improvements have been slowest where poverty and population growth are most pervasive. Continuing population growth plagues vast numbers of people who remain extremely vulnerable to crushing poverty. "Measured by the common standard of $1 a day, 1.3 billion people in the developing world live in extreme poverty. Most of these people are in Asia. Eighty percent of the world's poor live in twelve countries—and 62 percent live in China and India. Many countries will be able to reduce poverty if they can sustain recent [economic] growth rates and avoid worsening income distribution, but others [the poorest of the poor in high-population growth countries] will need to grow much faster" (World Bank 1998, 14–15). The demographic divide between Global North and Global South is entrenched, and until
the disparity is closed world population is likely to remain a global problem that breeds new disputes and difficulties.

An island of economic abundance surrounded by a sea of misery is bound to be precarious. But there are other trends underway that could make this forecast of an increasingly crowded planet, with poor countries growing in population and poverty while rich countries grow their wealth and reduce their population, less accurate. Many of the contemporary statistics and projections pointing to future population problems are purely demographic, and they can change in unpredictable ways. Furthermore, world population growth can and will change when human values change and policies are enacted that promote such value changes. For example, “the empowerment and education of women has now been accepted as a key contribution to reducing population growth [and many now see the value of] dividing the wealth and resources of the world more fairly” (Crump 1998).

In addition, the future of world politics may hinge on natural forces that have little to do with human values and choices but which nonetheless can transform the ways population growth and decline influence global decisions. Everything we now believe about the population problem could become obsolete if other demographic changes occur. “The old assumptions about world population trends need to be resolved. One thing is clear: the world is in for some rapid downsizing” and population redistributions (Singer 1999). We next identify some other global developments that could alter the debate over whether population really is a problem.

**THE CHANGING POPULATION PYRAMID: FURTHER TRENDS AFFECTING POPULATION**

Demographers emphasize fertility rates (births), mortality rates (deaths), and migration as the three basic factors that determine all population changes. Having already outlined some of the consequences of human choices about fertility, we need to look at the impact of mortality and migration more closely.

**The Global Spread of HIV/AIDS**

Although infant and child mortality rates remain discouragingly high in much of the developing world, at least they are decreasing. Life expectancy at birth each year since 1950 has increased on a global average, climbing to a record peak at the start of 1999 to sixty-six years (Vital Signs 1999, 100); on the other side of the ledger, world population has swelled as a consequence. However, this trend in rising longevity could reverse if globally transmittable diseases cut into the extension of life spans made possible by improvements in health care, nutrition, water quality, and public sanitation. Throughout history the spread of bacteria, parasites, viruses, plagues, and diseases to various ecospheres, regardless of state borders, have suspended development or brought down once-mighty states and empires (see Watts 1998; Oldstone 1998). This possibility is made no more evident than in the spread of the human immunodeficiency virus (HIV), the virus that causes AIDS (acquired immune deficiency syndrome).