Chapter Six

Population and Consumption

"I have been assured by a very knowing American of my acquaintance in London, that a young healthy child, well nursed, is at a year old, a most delicious, nourishing, and wholesome food, whether stewed, roasted, baked, or boiled..."[1]
Jonathan Swift, 1729

"No quantity of atomic bombs will stem the tide of billions...who will someday leave the poor southern part of the world to erupt into the relatively accessible spaces of the rich northern hemisphere looking for survival."[2]
Houari Boumedienne, President of Algeria (1965-1978) and Leader of the Group of 77 (less developed nations), in reference to the effect that insufficient aid from developed countries to developing countries would have.

"Imagine a truck delivering to your house each morning all the materials you use in a day, except food and fuel . . . If you are an average American, this daily delivery would be a burdensome load: at 101 kilos, it is roughly the weight of a large man. But your materials tally has only begun. By month's end, you have used three tons of material, and over the year, 37 tons. And your 270 million compatriots are doing the same thing, day in and day out. Together, you will consume nearly 10 billion tons of material in a year's time."[3]
Worldwatch Institute

"Americans and other first worlders—that's to say Europeans and Japanese and Australians—consume 32 times more resources. That's to say we consume 32 times more gas, and 32 times more metals, but by the same token we put out 32 times more waste like plastics and greenhouse gases, than do citizens of third world countries, and that means that one American equals 32 Kenyans in his or her impact on the rest of the world."[4]
Jared Diamond, UCLA Geography Professor

Learning to Question, Questioning to Learn

- What factors affect human population growth?

- What impact does growth have on the developed and developing world?

- Will the movements of large numbers of people into our ever-growing cities improve or worsen the problems posed by human population growth?

- How likely do you think it is that new technologies will emerge to provide answers to food and resource demands? What do you imagine such technologies might look like?

- Which do you think poses a bigger immediate threat to the health of the planet: population growth or consumption patterns?

Introduction

This chapter examines the global imperatives presented by population and consumption issues, beginning with a discussion of population statistics and projected population growth rates. It then delves into population pressures and issues, including poverty, ageing populations, *migration* and *urbanization*. The chapter ends with a discussion of consumption patterns and sustainable use of our planet's resources.

Global Population

Statistics and Projections

In 1804, the world population reached one billion, a historic milestone for humanity, a species that the human fossil record tells us has lived on earth for nearly 200,000 years.[5] Remarkably, it took only an additional 123 years for that figure to double to two billion in 1927. We have since been adding billions to the population at an ever increasing rate. From 1927-1960, a period of just 33 years, the population increased from two to three billion. It took an additional 14 years to reach four billion in 1974, 13 years to reach five billion in 1987, and twelve years to reach six billion in October of 1999.[6] While the annual percent of growth is now declining, population numbers will nevertheless continue to rise rapidly, reaching seven billion by 2012, eight billion by 2025, and nine billion by 2040.[7]

Although rapid population growth may be viewed as a fact of life or an unremarkable norm for many people today, it is actually a relatively new development in human history. Prior to the seventeenth century, population growth was slow and unsteady, with periods of growth followed by periods of decline due to war, famine, and disease epidemics. Outbreaks of the Bubonic Plague, also called the Black Death, for example, occurred periodically from the mid-

1300s through the mid-1600s, killing anywhere from 30 to 50 percent of the population in Europe and the Middle East.[8] Some estimate that the Black Death may have killed 35 million people in Europe alone, a mortality rate that had a substantial impact on total population size. By the middle of the seventeenth century, however, outbreaks of the plague were on the decline, death rates began to fall, people began living longer, and the rate of world population growth accelerated.[9]

The greatest human population growth occurred in the twentieth century, but particularly between 1965 and 1970, when growth rates soared to over two percent per year.[10] Prior to 1750, global population growth rates never exceeded half a percent per year, and until 1930, they never surpassed one percent per year.[11] In many developed countries, this dramatic growth, which included the post-World War II *baby boom*, was attributed to significantly improved health care and a concomitant reduction in death rates. Population growth rates did not begin to decline until other factors affecting birth rates emerged, such as the widespread availability and use of contraceptives and an overall shift in family planning patterns emphasizing fewer children. In less developed regions, such as Southeast Asia and parts of Latin America, we are only now seeing declining growth rates.

Declining birth rates in most of the world have led to decreases in the rate of population growth from two percent in 1971 to 1.3 percent in 1998, to 1.18 in 2008. By 2020, the growth rate is projected to reach below one percent per year. Some developed countries, such as Norway, are already approaching a *zero population growth rate*, while other countries, such as Japan, are experiencing *negative growth rates*.[12] But even at this reduced rate of growth, the annual population change, or the amount of people added to the planet each year, will continue to grow significantly. The annual population change is projected to reach its height in 2011, at

80,852,608, at which point the number of people added to the planet each year will slowly begin to decline.[13] One United Nations projection from 1999 indicates that the world will not achieve population stabilization until after the year 2200, when our numbers will have grown to over ten billion. [14]

Insert Table 6.1, World Population Milestones, and Table 6.2, Population Growth Rates: 1950-2050, here.

Although global population figures can give us a sense of the rapidity of population growth on the planet as a whole, it is also important to recognize that the world's population is not distributed evenly across the globe and that population growth rates vary by region. Asia, for example, has long had the highest population. In 1750, when the world population was estimated at 791 million, 65 percent of the population lived in Asia, 21 percent in Europe, and 13 percent in Africa. By 1900, 150 years later, major growth had occurred in Europe, which had jumped from 21 percent to 25 percent of the world population. Growth had also occurred in North America and Latin America, as each increased to five percent of the population. During the same period, both Asia's and Africa's percentages of the world population shrank to 57 and eight percent respectively. UN population forecasters predict, however, that by 2050, Asia's share of the world population will increase back up to 60 percent, while Africa's will have more than doubled to 20 percent. In contrast, Europe's share of the total world population will have declined to seven percent, less than one third its peak level in 1900. Put another way, over 1.7 billion people will be living in Africa in 2050, while only 628 million people will reside in Europe.[15] What we're seeing then, is a trend in which developed countries' populations are decreasing while developing countries populations are still increasing.

Fertility and Mortality

Demographers, people who study population, discuss population growth in terms of *fertility* and *mortality*, or birth and death rates. Population growth, which is sometimes referred to as the *natural increase,* occurs when fertility rates are higher than morality rates. Fertility is influenced by both biological and social factors. Biological processes affecting fertility include the period of time between puberty and menopause when women are able to reproduce, while social factors include marriage patterns, the age at which it is considered culturally appropriate for people to become sexually active, and the availability and use of birth control devices.

Fertility rates are also linked to regions. Although the global average number of children per woman is estimated at 2.55 for the 2005-2010 period, this average obscures the differences in fertility rates among regions. Specifically, fertility rates in the developed world are often close to *replacement levels*, while fertility rates in much of the developing world are much higher. During the 2005-2010 period, for example, 45 of the 73 countries with fertility levels below 2.1 children per woman are considered more developed. In contrast, all of the 122 countries with fertility rates above 2.1 children per woman are located in less developed regions. Finally, of the 27 countries with fertility levels that are at or above five children per woman, 25 are included among the world's least developed countries.[16]

Insert Table 6.3, Estimated Total Fertility for the World, the Major Development Groups, and the Major Areas, and Table 6.4, Total Fertility Rate and Life Expectancy at Birth: World, 1950-2050, here.

Demographic Transition

The theory of *demographic transition* attempts to account for these regional population differences in economic terms, positing a link between population growth patterns and economic developmental stages. Specifically, it equates industrial development with declining fertility.[17]

The "demographic transition" then, is the "movement of a nation from high population growth to low population growth, as it develops economically."[18] Most discussions of the demographic transition theory highlight four stages. Stage one is made up of pre-industrial countries with high birth rates and high death rates. Death rates are high due to factors such as famine and disease, while birth rates are high in order to increase the chances that children will survive into adulthood. Because the death rate almost completely offsets the birth rate, population growth is static or low. As countries being to develop, they enter stage two. In stage two, living conditions, food availability, and healthcare improve, resulting in a decrease in the death rate; however, the birth rate remains high, since children are viewed as both sources of labor and caretakers for their ageing parents. Declining death rates and high birth rates result in high population growth. In stage three, birth rates begin to fall due to many factors, including access to contraception, wage increases, better education, child employment legislation, and other urbanization factors that decrease the economic value of children. Finally, stage four is characterized by both low birth rates and low death rates, and thus by low rates of population growth as well.[19] Some countries, including a number of developed European countries, have achieved or are approaching population stabilization. In other words, the population is replacing itself but it is not getting larger. In other cases, Stage IV countries have seen their populations drop below replacement levels. Some demographers have suggested that population decline could be viewed as a fifth and separate demographic transition stage.[20]

The demographic transition model enjoyed widespread acceptance through the 1970s and 1980s, until studies emerged that began to undermine various aspects of it. For example, some studies suggest that fertility decline is not as closely linked to socio-economic levels as the theory postulated; rather, patterns of fertility decline are more closely correlated with regions that

share common languages and cultures.[21] Others point out that cultural values revolving around fertility change slowly and sometimes only partially in the wake of economic changes.[22] Additionally, some critics highlight the fact that the theory of demographic transition was based on observations of industrialized Western countries with primarily white populations. As a result, they argue that the theory is *ethnocentric* and thus flawed, since it assumes that all countries will go through similar transitions, regardless of cultural differences. Other critics argue that the theory fails to account for human agency and rational choice, reducing individuals to the pawns of a powerful theoretical principle over which they have no control.[23] Although critics of demographic transition theory remind us that socio-economic changes are not the only source of demographic shifts, most scholars would agree that economic development is an important force that has influenced demographic changes in the past and that continues to influence them today. As such, despite its limitations, the theory remains useful as one among many ways of understanding demographic change.[24]

Population Pressures

Population and Poverty

Many population analysts and social commentators insist that the best way to alleviate poverty in the developing world is to control population growth. In *The Population Bomb* (1968), for example, biologist and demographer Paul Ehrlich decried what he saw as the explosive problem of rapid population growth in developing countries. According to Ehrlich, masses of people and uncontrolled growth lead to poverty and chaos. In response to Ehrlich's expressed feelings of fear about population growth in developing countries like India, Columbia University professor Mahmood Mamdani pointed out in *The Myth of Population Control* (1972) that Ehrlich might have been confronted with even larger crowds than those that frightened him Delhi in

Western cities such as New York and London. Mamdani suggested that what Ehrlich found problematic, and indeed feared, was the apparent “otherness” of the populations in places like India rather than the density of the population alone. A more recent study of the relationship between poverty and population growth indicates that high fertility increases poverty by slowing economic growth and “skewing the distribution of consumption against the poor.” [25] The researchers estimate that had the average country in the group of 45 studied lowered its birth rate by five births per 1000 women during the 1980s, as had many Asian countries, poverty would have been reduced by a third.[26]

While population growth and poverty are often linked, it would be a mistake to think that population growth always inevitably leads to poverty. In fact, historically, the reverse has frequently been true, as population growth has often been correlated with economic prosperity and population decline with economic decline.[27] For example, the Irish had comparatively stable population growth rates until the late 18th century, long before modern contraceptives were available. However, between 1780 and 1840, the Irish population doubled from four to eight million. Factors that contributed to the rising Irish fertility rates included the increase in the number of small farms made available by rent-seeking British landlords and the advent of wide-scale potato farming. Both of these factors increased economic opportunities for the Irish, which in turn allowed people to marry at a younger age, thereby increasing fertility. However, in 1846, when blight struck the potatoes, the principal food source for the Irish, calamity and famine resulted. Over 1.5 million died, and hundreds of thousands emigrated. In the wake of the great famine and the economic devastation that accompanied it, the Irish population dropped from 8.2 million in 1841 to 4.5 million in 1901.[28]

Large populations also provide new markets and economic growth potential in ways that countries with small populations and/or stagnant population growth rates cannot. Consumer power, for example, is already shifting to growing economies with large populations, most notably China, which has a population of over 1.3 billion people. While China has instituted a number of policies aimed at curbing population growth, it still has more than a billion more people than the United States. However, its large population has not hindered its recent economic rise. China's economy, with its huge workforce and a large middle class, is now the second-biggest in the world. It is predicted to surpass the United States' by 2035 and to be nearly twice the size of America's by 2050.[29] Clearly then, large populations cannot always be equated with poverty.

World Population Ageing

Population ageing, "the process by which older individuals become a proportionally larger share of the total population," began in the twentieth century in more developed countries but has expanded to the developing world as well.[30] It is an unprecedented global demographic trend that will affect every country in the twenty-first century, though the pace of change will vary. Population ageing is the result of declines in both fertility and mortality. In other words, we are both living longer and having fewer children. Today, global life expectancy is approximately 66 years, up a remarkable 20 years from 46.5 years in 1950-1955. By 2050, global life expectancy is projected to increase by another ten years to reach 76 years.[31]

Insert 6.4 here.

The total number of older persons living on the planet tripled between 1950 and 2000 and is projected to triple again by 2050. To put these numbers in more concrete terms, in the year 2000, one in every ten people in the world was 60 years old or older; by the year 2050, more than

one in every five people on earth is projected to be aged 60 or over. [32] In the more developed regions of the world, there are already more older people than children; about 19 percent of the population is 60 years or older, while children under 15 years make up 18 percent. By the year 2050, this slight difference between percentages of older people and children under 15 will have increased dramatically; the proportion of children is projected to shrink to 16 percent while the proportion of older adults will have grown to 34 percent. In developing countries, these trends have been slower, with people over 60 making up only eight percent of the population. However, by 2050, the proportion of older people in developing regions is projected to reach 19 percent.[33]

Population ageing will have many social and economic implications for societies around the globe. While some analysts argue that our economies can provide for the growing needs of the aged, such as health care and social security, others are not as certain. As people live longer, they will need social benefits for longer periods of time. If social security systems don't change to meet these increased needs, they will become increasingly ineffective, ultimately running out of resources altogether. Also, older people typically need more health services, which will lead to increased demands for long-term care and increased medical costs. Population ageing also means that while more people will be drawing upon health and pension funds, these funds will be supported by a smaller number of contributors. This will place a heavier demand on the working age population to maintain benefits for the older population. Declines in fertility may also result in fewer family members for older people to turn to for help and support. However, an ageing population may also push for reforms in pensions, social security, and health systems that will reduce the need for younger generations to support the older ones.[34] Moreover, some developing societies are actively trying to increase the younger working population that is supporting the growing older population by encouraging young people from developing

countries to immigrate. This strategy has the potential to both increase the productive support base of workers in developed states and reduce problems of unemployment in developing states.

Migration

The term *migrant* refers to a person who has left her home for another. Some people migrate within their own country, while others leave their home country altogether. Various *push-pull factors* influence individuals' decisions to migrate. Pull factors, for example, include the promise of better living conditions in a new country, while push factors include the flight from violence, poverty, or oppression.

Historically, the movement of peoples from their places of origin to other regions around the globe has always affected patterns of population concentration and regional economic growth. However, there was a significant increase in international migration after World War II, and then again more recently, with the advent of the rapid globalization processes that began in the 1980s. Much of this recent international migration has been from the developing world to the developed world. Indeed, the number of migrants in developed countries more than doubled from 1980 to 2000 from 48 million to 110 million. During that same period, migration to developing countries grew at a slower pace, from 52 million to 65 million.[35] In 2005, there were 191 international migrants, or put another way, migrants made up approximately three percent of the world's population. Today, nearly one in every ten persons living in more developed regions is a migrant, whereas in developing regions, only one of every 70 persons is a migrant. Most of the world's migrants live in Europe (64 million), followed by Asia (53 million) and North America (45 million).[36] As large as these numbers are, a great deal of migration still occurs within countries, or within regions. Many migrants move from the countryside into towns and

cities, for example. This is particularly true of migration in the developing world, where over 81 percent of the world's population lives.[37]

Insert Table 6.5, International Migrants by Major Area, 1960-2000, here.

Poverty is a primary push factor for migration. Many people realize that their only hope for escaping poverty is to migrate to another country. Africa, for example, which is projected to face a continued downward spiral of poverty coupled with increased population growth rates, will likely be a major source of migrants seeking work. Many Africans have already migrated to Europe in search of economic opportunities. Migrants from developing countries who find work in developed countries often send *remittances* home to their families. Total global remittances in 2004 amounted to $226 billion, $145 billion of which went to less developed regions. For some countries, remittances play a major role in the economy. For example, in 2004, remittances accounted for more than 20 percent of the gross domestic product (GDP) of Haiti, Jordan, the Republic of Moldova, and Tonga.[38]

<table>
<tr><td colspan="2">Researching to Learn:
Investigating the Economic Impact of Recent Migration Patterns</td></tr>
<tr><td>Sample Keyword Searches

Broad search: migration AND economics

Narrower searches:
• poverty AND “human migration”
• migration AND remittances

Complex search: “global migration patterns” AND (remittances OR poverty)
Note:
• Use quotations to search for terms as a phrase
• Use AND to find documents with all terms listed,</td><td>Books: Find Them @ Your Library
Hatton, Timothy J. and Jeffrey G. Williamson. The Age of Mass Migration: Causes and Economic Impact. Oxford, UK: Oxford University Press, 1998.

Lucas, Robert E. B. International Migration and Economic Development: Lessons from Low-income Countries. Cheltenham Glos, UK: Edward Elgar Publishing, 2005.

McNeil, William H. and Ruth S. Adams, eds. Human Migration: Patterns and Policies. Bloomington and London: Indiana University Press, 1978.

Ozden, Caglar and Maurice Schiff, eds.</td></tr>
</table>

- *Use OR to find documents with either one term or the other,*
- *Use parentheses to combine AND and OR statements in creative ways*

Free Web Resources

Columbia Law School. http://www.law.columbia.edu/center_program/migration.

Inter-University Committee on International Migration. http://web.mit.edu/cis/www/migration/.

Migration Policy Institute. http://www.migrationpolicy.org/.

Population Council. http://www.popcouncil.org.

United Nations. http://www.un.org.

U.S. Department of State. http://www.state.gov/g/prm/mig/.

International Migration and Economic Development (World Bank Trade and Development Series) (World Bank Trade and Development Series). Washington, DC: World Bank Publications, 2007.

Papademetriou, Demetrios G. and Philip L. Martin. *The Unsettled Relationship: Labor Migration and Economic Development*. Westport, CT: Greenwood Publishing Group, 1991.

Zarkovic Bookman, Milica. *Ethnic Groups in Motion: Economic Competition and Migration in Multiethnic States.* London, UK: Cass, 2002.

Zimmermann, Klaus F. *Migration and Economic Development*. New York, NY: Springer, 1992.

Articles: Find Them @ Your Library

Bauer, Thomas K., John P. Haisken-DeNew, and Christoph M. Schmidt. "International Labor Migration, Economic Growth and Labor Markets - The Current State of Affairs." RWI Discussion Paper No. 20 (August 2004). http://ssrn.com/abstract=784548.

Borjas, George J. "The Economics of Immigration." *Journal of Economic Literature* Vol. 22 (December 1994): 1667–1717. http://ksghome.harvard.edu/~GBorjas/Papers/JEL94.pdf.

Urbanization

Since the beginning of the 20th century, the largest migration flows have been from rural to urban areas. This accelerating urbanization trend began with the *agricultural revolution*, which provided sufficient surplus food to sustain people in towns and cities. Then, in the late 19th century, the *Industrial Revolution* transformed working and living patterns. Millions of people flocked to urban industrial centers, putting increasing pressure on the environment

through pollution and increased rates of consumption. The same patterns that emerged in Europe and the Americas have now hit Africa and Asia. In these regions, the urban population rose from 18 percent of total population in 1950 to over 40 percent in 2000. This rapid growth is only going to continue in the coming decades; indeed, the urban population in Africa and Asia is expected to double between 2000 and 2030. To put these numbers into a broader context, "the accumulated urban growth of these two regions during the whole span of history will be duplicated in a single generation."[39]

The year 2008 marks the first time in human history that more than half of the world's population lives in urban areas.[40] By 2050, global urbanization levels are expected to rise to 70 percent.[41] Many people will live in so-called *mega-cities,* urban areas with more than ten million residents. This dramatically increased trend toward urbanization has profound implications for patterns of population growth and consumption. In many urban environments, residents tend to be better educated and more affluent; they are often in better health and thus live longer than rural people. Additionally, they tend to have lower fertility rates, even to the point of negative growth. However, this is not the trend in many developing countries, where urban areas are growing at dramatic rates, and much of this growth is occurring in slums. Few if any of the benefits that have come to be associated with urban life in developed countries since the last half of the twentieth century can be found in the developing world's urban slums. There are also important consumption issues that have emerged because of this urbanization trend. Although urban residents live on less than two percent of the world's landmass, they consume a disproportionate amount of resources and contribute disproportionately to global pollution when compared with their rural counterparts. Continued rapid urbanization is likely to exacerbate these consumption and pollution disparities in the near future.

However, while cites currently are the locus for many of the world's major environmental problems, including pollution, resource degradation, and waste generation, urbanization itself need not necessarily lead to environmental problems. Rather, our current problems are due to unsustainable patterns of production and consumption as well as to inadequate urban management.[42] Experts point out that the concentration of the world's population in urban areas actually offers more opportunities for long-term sustainability than would the dispersion of that population across the globe. Also, the urbanization trend might ultimately help us approach population stability, since urbanization provides few incentives for large families. Nevertheless, the problems associated with urbanization will not magically take care of themselves; rather, they will require careful preparation and management.[43]

Consumption

Agricultural Production and Consumption

Famine, demographic pressures, and the unequal distribution of food are as old as the earliest human civilizations. As far back as 3500 BCE, the ancient Mesopotamians relied on agricultural surpluses to sustain settled urban populations. When drought struck, they suffered from hunger, *malnutrition*, and famine. In the Egyptian Old Kingdom (c. 2800 BCE-2100BCE), priests and pharaohs denied common people access to temple granaries during famines lest they deplete stores earmarked for royalty.[44] Historically, the victims of social and economic inequity have sometimes even been blamed for their own starvation. In the 1720s, for example, British observers condemned the people of Ireland for poverty, which they erroneously linked solely to overpopulation rather than to any of their own colonial policies. Rapid population growth continues today, and the accompanying consumption issues and questions are increasingly complicated and urgent. Though we still must face region-specific droughts, famines, and other

crises, we must also confront the larger issue of the entire world's *carrying capacity*, or the ability of the Earth's natural environment to sustain the human population.

In the late 1700s and early 1800s, English demographer and theorist Thomas Malthus was one of the first to highlight the potential problems of population growth and unbridled consumption. In his *Essay on the Principle of Population* (1798), Malthus argued that if population growth remained unrestricted, our numbers would increase geometrically (1, 2, 4, 8, 16...) while our food supply could only ever be increased at an arithmetic rate (1, 2, 3, 4, 5...), thus creating a widening gap between the number of people on the planet and the amount of food available to feed them.[45] In short, he argued that people were poor because there were too many of them and not enough resources. Although he warned that our inability to increase our food supply at the same rate as our population would lead to drastic levels of political and economic instability, he also suggested that population growth would generally be checked by factors such as famine, disease, and war.

Malthus' theories have had a significant influence on demographers ever since, and his ideas have contributed to growing concerns about the planet's carrying capacity. However, Malthus has his critics as well. Common criticisms include his failure to anticipate how advances in technology, transport, and agriculture would increase productivity as well as how economic and medical advances would contribute to declining fertility.[46] Because of scientific and technological advances, massive geometric population growth in the 20th century did not result in a *Malthusian catastrophe,* as agricultural production outpaced population growth. From 1960-2000, the global production of cereals, such as corn, wheat, and rice, more than doubled, and meat production nearly tripled.[47] Per capita calorie consumption (all food available for consumption) also increased globally by 17 percent from 1970 to 2005. Daily per capita calorie

consumption in 2005 was at 3418 calories per day in developed countries and 2733 calories in developing countries.[48] In short, due to increased agriculture production, there was enough food to feed everyone on the planet a nutritious and sustaining vegetarian diet, despite rapid population growth.

Insert Table 6.6, Calorie Availability: Developed vs. Developing Countries, here.

Although some people believe that advances in science and technology will continue to meet the needs of the Earth's ever growing population, most experts maintain that the planet's carrying capacity is finite, and that we are quickly depleting it. Many who subscribe to this perspective point to the millions of people for whom access to food is already a daily struggle and famine is a constant threat as evidence that the world cannot sustain such a large population. They argue for dramatic efforts to reduce population, targeting mostly the developing world where population growth rates are projected to remain high. Others argue that although it is true that many people around the world suffer from hunger, this situation is not always directly related to the planet's carrying capacity. Rather, these experts urge us to pay attention not only to the planet's carrying capacity but also to the fact that hunger, malnutrition, and famine are often products of human behavior and policies, including economic inequality and the lack of what Noble Prize winning economist Amartya Sen calls people's "entitlement" to food. Sen's studies have shown that modern famines and problems of hunger persist even when food is available. In many countries, famines have occurred when there was enough food to feed everyone, but the food was only accessible to those in power and/or it was exported to other countries for profit.[49]

In these kinds of scenarios, carrying capacity is not the issue. Rather, the issue is that people have been deprived of *food security*. According to the United Nations, food security is a "state of affairs where all people at all times have access to safe and nutritious food to maintain a

healthy and active life." [50] Although the UN maintains that food security is a basic human right, millions of people throughout the world are hungry not because of a food shortage but because of poverty. In other words, the food exists; many people simply do not have enough money to purchase it. As a result, profound levels of poverty, undernourishment, and ill health affect billions of people in the developing world, while at the same time, people in the developed world are increasingly suffering from the ill-effects of over-consumption. Obesity, diabetes, cardiovascular disease and a whole host of related health problems afflict millions of people who over-consume, including an alarmingly high number of children. Across the world, over 1.2 billion people consume more calories than they need, many of which have poor nutritional value. In contrast, another 1.2 million are hungry, experiencing a deficiency of calories and protein. [51] Millions more suffer from malnutrition, which results in ill health and compromised life expectancy. Women and children in the developing world are the hardest hit by malnutrition. More than five million children die of diseases related to hunger every year while thousands more are adversely affected physically and mentally by malnutrition.[52] Although hunger takes its greatest toll on children and women in South Asia and sub-Saharan Africa, increasing numbers of urban poor in Latin America suffer from hunger. Moreover, it is estimated that up to ten percent of U.S. households experience food insecurity.[53] In contrast, one in five (20 percent) of American children are considered overweight or obese.[54]

Insert Table 6.7, Types and Effects of Malnutrition, and Number Affected Globally, 2000, here.

Costs of Increased Agricultural Production

While improvements in food production have allowed us to feed our growing population, they have exacted many costs as well. The shift to intensive agricultural production to feed more people has increased our consumption of basic resources, such as energy, land, and water. Some

of our strategies for producing larger amounts of food have been particularly problematic. For example, the so-called *Green Revolution* of the 1950s (which, despite its name, actually marked the advent of the large-scale use of chemically based agriculture) was an effort by scientists to engineer a limited number of improved strains of wheat and corn in order to increase food supplies in developing countries. Initially, this proved to be a great success because these strains yielded much larger crops than had previous grains. These new strains, however, required much more water and fertilizers than the prior strains. As more farmers in the developing world switched to these varieties, they incurred greater and greater costs as water grew scarce and fertilizers, which are derived from declining petroleum oil reserves, became more expensive. The use of irrigation and fertilizers also created favorable conditions for the growth of weeds, which in turn caused farmers to seek out expensive and toxic herbicides. Overall, the Green Revolution proved a costly disaster for many poor farmers and it wreaked massive environmental damage.[55]

Advocates of the Green Revolution and modern commercial agriculture point out that their techniques have led to dramatic increases in the world's food supply. Critics argue, however, that modern agriculture has achieved its goals through costly and inefficient practices, wasting resources and consuming more energy than it produces. Studies show that farmers in developing countries who use their own human power and basic tools, such as an ax, hoe, and machete, expend approximately one calorie to produce about ten calories of food energy. In contrast, U.S. farmers use about 2.8 calories of fuel per calorie of food grown.[56] Rice farming offers a startling example of the energy inefficiency of modern farming techniques. While modern rice farming produces a negative one to ten energy return, traditional rice farmers in Bali are reported to produce up to 15 calories for every one calorie used.[57] It is also important to note that more energy is expended on food processing, packaging, distributing, and marketing than on

growing the actual food product.[58] The energy needed to produce, package, and transport the aluminum tray that a TV dinner sits in, for example, is more than the energy contained in the food itself.[59] The production and packaging of soft-drinks requires particularly high inputs that contrast sharply with the amount of food energy they contain. Energy is expended on both the pressurized systems that incorporate carbon dioxide into the liquid and the production of the aluminum can that holds it. A can of diet soda that contains one calorie, for example, requires about 2200 calories of fossil energy to produce.[60]

As a result of these kinds of issues, new approaches to food production and consumption are emerging. One such approach is the *locavore* movement, which encourages people to eat foods produced locally, or within a short radius from their home. Locavores maintain that eating locally grown foods is an environmentally friendly practice because it reduces transportation distances and thus also reduces greenhouse gas emissions. They also argue that locally grown foods taste better and are more nutritious. Additionally, many view supporting small-scale, local producers as an added benefit of eating locally, contributing to the vitality of the community and encouraging responsibility. Local producers, for example, can be immediately identified and held accountable if they sell contaminated foods that make community members sick. In contrast, it can be much more difficult to ascertain the source of a food related illness and to contain and limit its effects when, for example, contaminated spinach grown in Salinas, California is shipped all over the United States. Finally, some people favor supporting local over global food markets because of labor issues. The global coffee market has, for example, been condemned for favoring wealthy consumers in developed countries at the expense of poor and politically weak producers in Africa.[61] In some cases, however, as Peter Singer and others have shown, buying on the global

market but from small-scale producers who employ sustainable agricultural practices can be an environmentally sound and ethical decision.[62]

Consumer Culture

Purchasing goods and consuming materials in excess of our basic needs is not a new phenomenon, but the rate and level of consumption shifted dramatically in the early years of the twentieth century. This period saw the invention of the category of the consumer—people who buy and accumulate goods—and with it the development of a consumer culture—a culture that is permeated by and encourages the production, sale, and purchase of commodities. Buying, selling, and accumulating are so integrated into people's lives in the developed world that consumer culture may seem to be the natural order of things or the logical way that societies should be organized. However, consumerism is not an innate human trait and many cultures around the world have discouraged the accumulation of wealth. Even in nineteenth century America, moderation and self-denial were dominant cultural values, and people were expected to save money, purchasing only the necessities. During this period, more than half of the population lived on farms where they produced much of what they consumed.[63]

By the early twentieth century, however, American culture had changed. Merchants no longer waited passively for people to buy goods when they needed them; instead, increased attention began to be paid to marketing and presenting goods in a way that would make people want to buy them, whether they needed them or not. Business schools began to emerge at universities around the country, teaching people the fundamentals of marketing, sales, and accounting. Governmental agencies, such as the Commerce Department, were developed to promote consumption. The consumer economy was also advanced by the transformation of laborers into consumers as businesses began increasing workers wages. Later, the expansion of

credit introduced additional buying power into the economy. Mortgages, auto loans, and credit cards all became easier to acquire. With these changes came changes in values from frugality to fulfillment through spending. While these changes were not unique to the United States, as many occurred in Western European countries as well, they occurred with increased rapidity and intensity in America.[64] Today, financial institutions and manufacturers, such as automotive companies, have spread the pattern of debt-based consumption around the world.[65] Many argue that people's lives, particularly in the developed world, have been dramatically improved by consumer culture and the products it makes available—new machines, medicines, foods, transport, houses, and information and communication technologies. There are, however, important social and environmental costs involved in what and how we consume.

Global Consumption Patterns

The question "how many people can the earth sustain?" is inextricably linked to resource consumption issues. Although agricultural production and exploding population growth rates in the developing world are important concerns, so too are the high consumption and waste rates of the developed world. Resource consumption and waste production rates are about 32 times higher in North America, Western Europe, Japan, and Australia than they are in the developing world. Approximately one billion people have a consumption rate of 32, while most of the world, or 5.5 billion people, have much lower consumption rates, with many closer to or at one. What this means is that population booms in developing countries are not, at least initially, as big of a threat to the world's resources as are current American consumption patterns. Each American consumes as many resources as 32 Kenyans, for example, and with a population ten times the size of Kenya, the U.S. consumes 320 times more resources.

The developed world's current consumption patterns are considered by many experts to be unsustainable, but the situation is exacerbated by the fact that many developing countries are slowly approaching the developed world's standard of living, which means consuming like developed countries consume. If India and China were to consume like Americans, the world consumption rate would triple, and if the whole developing world were to do so, world consumption rates would increase 11 times. Should such a scenario come to pass, it would be as if the world population had expanded to 72 billion people, a figure which the planet could not support. [66]

Americans in particular consume more resources than any other nation in the world. The U.S. not only has the world's largest Gross National Product but also has the largest *ecological footprint*, impacting the planet's resources and ecosystems more than any other country.[67] Over the past fifty years, U.S. consumption rates have dramatically increased. For example, in 1950, the average size of a new home was 983 square feet. By 2004, it had increased to 2,349 square feet, requiring more than twice as many resources to both build and maintain.[68] Suburban sprawl, characterized by low density residential subdivisions, commercial strips, retail complexes, and large parking lots, has become the dominant land-use pattern in the U.S. Unfortunately, this pattern requires more of practically every resource, from energy to water. Since everything, from homes to jobs to malls, is so spread out, sprawl requires people to drive further distances, increasing fossil fuel combustion, which puts more greenhouse gasses into the atmosphere. Americans also love their cars, and many drive alone to work rather than carpooling or using public transportation. Additionally, Americans use 75 percent more water per capita than the average person in the developing world, lavishing it on lawns, water intensive plants, and golf courses.[69] The U.S. is also the world's largest consumer of forest products, using more than

twice that of developing countries per capita and ten times that of the world in 2000.[70] Americans also produce huge amounts of trash. Between 1960 and 2005, trash production doubled, from 83 million to 167 million tons. [71] Each American produces about five pounds of trash daily, which is five times the average amount produced by people in developing countries.[72] While recycling and composting efforts have also increased in recent years, they are far from keeping pace with patterns of consumption and waste production.

Among the costs of U.S. consumption and waste production trends has been severe environmental damage. Approximately 40 percent of the rivers, 46 percent of the lakes, and 50 percent of the estuaries in the U.S. are too polluted to allow for fishing and swimming. Additionally, 53 percent of America's wetlands have been lost to urban and suburban development and agricultural land-use changes.[73] Many fisheries are over-fished or contaminated, and thousands of acres of prime farmland continue to be lost to development. Over 1,000 plant and animal species are listed by the U.S. government as endangered, and over 300 as threatened.[74] This is consistent with a world-wide biodiversity decline, which many scientists believe is actually the earth's sixth mass extinction.[75] Unlike previous mass extinctions, this one is due primarily to human activity.

Environmental challenges are not projected to get any better, in part due to climate change. Since the advent of the Industrial Revolution, concentrations of many *greenhouse gases* (natural and *anthropogenic* gasses in the atmosphere that affect the earth's temperature) have increased. For example, while the atmospheric concentration of the greenhouse gas carbon dioxide remained between 260 and 280 parts per million for the 10,000 years prior to the advent of the industrial era, CO_2 levels have since increased by about 100 parts per million (ppm). Also worth noting is the accelerated rate of CO_2 increases. During the 200 years marking the start of

the Industrial Revolution to approximately 1973, CO_2 levels increased by 50 ppm. In just 33 more years, from 1973 to 2006, CO_2 levels increased by another 50 ppm. These rapid increases are the direct result of human activity, including the burning of fossil fuels, such as coal, gasoline, and natural gas. But CO_2 is not the only greenhouse gas that has been increasing in the atmosphere due to human activity. Increased concentrations of methane, for example, are due to food production practices. Livestock *enteric fermentation* and manure management, paddy rice farming, and the development of wetlands contribute to increased levels of methane in the atmosphere. Man-made chlorofluorocarbons (CFCs), which are used in refrigeration systems and fire suppression systems, are also contributing to the growing layer of greenhouse gases in our atmosphere. As the name suggests, greenhouse gasses are contributing to an increase in global temperatures, a phenomenon which has been alternatively dubbed “global warming” and “global climate change.” Climate change has the potential to radically alter our entire global ecosystem in potentially devastating ways. Rising sea levels and severe weather, for example, are predicted to severely impact coastal areas.[76]

Other population and consumption related environmental threats include the world’s dwindling supply of renewable resources. For example, we have more than tripled our withdrawals of water from the planet since 1940, from 1088 cubic kilometers per year in 1940 to 3973 in 2000.[77] Freshwater reserves are finite, and as we increase our use of them, we drain water tables and take ever more water out of circulation. As a result, many countries are experiencing *water stress,* where projected demand outstrips reserves. Some countries are currently in a state of depletion; They have taken out more water than nature can replenish, leading to *desertification*. Many countries are already dependent upon external supplies of water. For example, 97 percent of Egypt’s fresh water comes from external sources.[78] Humans have

also depleted ocean fish stocks at a staggering pace, increasing our demand for the world fish catch fivefold since 1950, from 18 million tons to 90 million tons in 1990.[79] We have over-fished some species, such as Atlantic cod, southern bluefin tuna, and swordfish, to the point where they are no longer a commercially viable catch species.[80]

Deforestation and the concomitant loss of biodiversity in rain forests and other sensitive ecological areas is another major challenge posed by population and consumption. Some argue that the global loss of forest areas is a product of population growth, which causes more people to cut down trees in an effort to eke out a living on the land. This problem is likely to continue, as grain production and available agricultural land have dropped on a per capita basis as our population grows. Others point out that forest losses are also driven by new and increasing consumer demands in the developed world for everything from paper products to old-growth tropical timber, such as mahogany. Problems posed by deforestation include the loss of our planet's biodiversity. Habitat loss has led to the endangerment and extinction of thousands of animal, insect, and plant species, threatening many *indigenous peoples'* livelihoods in the process. The destruction of rain forests around the equator also contributes to global warming, accounting for up to 25 percent of global emissions of green-house gases.[81] And as the forests shrink, there are then fewer trees to absorb carbon dioxide, exacerbating global climate change.

In Focus: Population Growth, Ageing, and Consumption in the Land of the Lonely Hearts Club

China has long been recognized as one of the world's most important countries in terms of the global impact of its large population. China is about the same geographic size as the U.S., but its population, 1.3 billion strong, is nearly five times that of the U.S.'s. Even though China's rate of population growth is slowing, its large population base has a momentum that will

continue to add up to 200 million people over the next two decades. Thereafter, its population is projected to decline by nearly four million people during the years 2025-2050. The reasons behind this dramatic population shift reside in China's recent history.

Following the *communist revolution*, China experienced unprecedented population growth and population fluctuations. Between 1949 and 1980, the population grew from 540 million to over 800 million. Some have argued that this extremely rapid growth led to a severe Malthusian "check" in the form of a devastating famine. The famine hit during the G*reat Leap Forward* (1958-1961), a period when China's government sought to restructure its economy, building an industrial base by relocating rural farmers to industrial villages. It is estimated that over 30 million people died during the famine, although the Chinese government attempted to conceal the figures. The causes of the famine are complex. While the shifting of farmers away from agricultural production may well have been a factor in reducing the harvest of crops, there were other factors as well. Severe weather, drought, and poor communication between regions contributed to localized shortages, but one of the main factors behind the long duration and extent of the famine was poor governmental planning. Although the government had long viewed population growth as a potential asset for economic growth, the disaster of the feminine caused they to change their views.

In the 1960s, the government began encouraging families to have fewer children. By 1979, birth control clinics advocating family planning gave way to a much more concerted effort to reduce population growth via the "one-child policy" for urban families and a two child rule for rural families. This policy employed a combination of propaganda, social pressure, and state coercion to limit Chinese families to just one child. Those who complied were given "one-child certificates," which brought significant rewards, including cash bonuses and highly desirable

housing. In some cases, those who did not comply were pressured to have abortions or to undergo sterilization. There were also widespread occurrences of infanticide, particularly of female babies, since male children have traditionally been considered much more desirable in Chinese society. This patriarchal privileging of male children in conjunction with the one-child policy led to a significant gender imbalance. More recently, improvements in medical technologies that provide easy and inexpensive ways to determine the sex of the fetus, such as ultrasound scans and chromosomal testing, have helped to exacerbate the gender imbalance. Currently, between 117 and 120 boys are born in China for every 100 girls. The problem has become so severe that the government has outlawed doctors from revealing the sex of the fetus to the parents. Despite these efforts, there is a dramatic shortage of females in the population, and China has been dubbed the world's largest "lonely hearts club," as over 23 million men are unable to find a female partner for marriage. State officials are now concerned that this imbalance could lead to social instability, higher rates of crime, and rampant prostitution, the latter of which also has the potential to contribute to a major AIDS epidemic.[82]

In addition to a gender imbalance, China will also have to confront the issues that accompany an aging population. A projected 397 million Chinese citizens will be 60 years of age and over by the year 2040. As the country continues to seek to reduce its population growth rates, and as the male-female imbalance continues to have the potential to undermine fertility, many are concerned that there will not be a sufficient support base to take care of the elderly. In the absence of familial support, the aged will have to turn to the state for financial help, significantly draining the country's resources. The pressing question will be whether China's surging economic growth can provide for this ageing population.[83]

China's population growth and shifting demography are also connected to its dramatically increased role in the global economy. Along with the rest of Asia and the developing world, China is experiencing a dramatic rise in urbanization. Experts project that Chinese cities will contain 800 million people by 2020.[84] These new urban dwellers will contribute to both economic growth and consumption, as city residents typically consume many more resources than rural people. Also, as China's population growth slows, it is shifting to policies that support *economic modernization,* and these policies are creating significant new demands on global resources. As its economy has grown, China has changed its patterns of consumption of global products. From a nation where virtually every household relied on a bicycle, it is now entering the automobile society, with car and light truck sales climbing yearly. This has had a major impact on gas prices the world over, as China's demand for oil rose by 11 percent in 2005. If China's 1.3 billion people start using the same amount of oil as Americans (who currently use about 26 barrels per person per year compared with 1.5 barrels per person in China), it would need some 80 million barrels of oil a day–20 million more barrels than the entire world currently produces. Similar increases are likely for other products as well, from meat and fish to air travel. This increased production and consumption will, moreover, contribute to markedly increased rates of pollution and environmental degradation, including poor air quality and dried up or polluted rivers.

Still, there are some hopeful indicators for China's future. The Chinese government seems well aware of the potential pros and cons of economic liberalization and modernization. It retains a high degree of control, for the time being, over broader political policies and it can make choices about growth. It is acutely aware of rising costs for non-renewable energy sources, such as coal and oil, and it is grappling with mounting health costs from both pollution and

potential epidemics. It has sought to use new renewable energy technologies and sources to offset the costs of other non-renewable energy sources. Solar and wind energy currently provide for some 35 million Chinese homes. China will, nevertheless, be a major player in the competition for global resources of all kinds in the near future.[85]

Researching to Learn:
China and Population

Sample Keyword Searches

Broad search: China AND population

Narrower searches:
- China AND population AND projections
- "one child policy" AND China AND population

Complex search: "Chinese population" AND (ageing OR elderly) AND "consumption patterns"

Note:
- *Use quotations to search for terms as a phrase*
- *Use AND to find documents with all terms listed,*
- *Use OR to find documents with either one term or the other,*
- *Use parentheses to combine AND and OR statements in creative ways*

Free Web Resources

China Population Information Center. http://www.cpirc.org.cn/en/eindex.htm.

International Human Dimensions Program on Global Environmental Change. http://www.ihdp.unu.edu/.

Population-Environment Research Network (PERN). http://www.populationenvironmentresearch.or

Books: Find Them @ Your Library

Banister, Judith. *China's Changing Population.* Sanford, CA: Stanford University Press 1987.

Greenhalgh, Susan and Edwin Winckler. *Governing China's Population: From Leninist to Neoliberal Biopolitics.* Sanford, CA: Stanford University Press 2005.

Kane, Penny. *The Second Billion, Population and Family Planning in China.* Ringwood, Australia: Penguin Books, 1987.

Lee, James Z. *One Quarter of Humanity: Malthusian Mythology and Chinese Realities, 1700-20.* Harvard, MA: Harvard University Press, 1999.

Peng, Xizhe and Zhigang Guo, eds. *The Changing Population of China.* Oxford, UK: Blackwell Publishing, 2008.

Scharping, Thomas. *Birth Control in China 1949-2000 Population Policy and Demographic Development*. New York, NY: Routledge, 2003.

Articles: Find Them @ Your Library

Burdett, Richard. "Beyond City Limits." *Foreign Policy*, 164 (Jan/Feb. 2008): 42-43.

Calvo, Esteban and John B. Williamson. "Old-age pension reform and modernization pathways: Lessons for China from Latin America." *Journal of Aging Studies*, 22, no. 1

g/. *United Nations* http://www.un.org	(January 2008): 74-87. Flaherry, Joseph Henry, Mei Lin Liu, Lei Ding, Birong Dong, Qunfang Ding, Zia Li and Shifu Xiao. "China: The Aging Giant," *Journal of the American Geriatrics Society.* 55, no. 8 (August 2007): 1295-1300. Nomile, Dennis. "China's Living Laboratory in Urbanization." *Science,* 319, no. 5864, (2008): 740-743. Nowak, Rachel. "China's demographic crunch." *New Scientist*, 196, no 2629 (November 2007): 62-63.

Conclusion

The world's population grew rapidly in the twentieth-century, but particularly between 1965 and 1970, when growth rates soared to over two percent per year. Although the annual percent of growth is now declining, population numbers will nevertheless continue to rise rapidly, reaching nine billion by 2040. Population growth is often linked with poverty, but research shows that population growth itself does not always inevitably lead to poverty. However, as the population continues to grow, the world will have to confront a variety of issues emerging around ageing populations, migration, and urbanization.

Although the populations of developed regions are slowly declining, they nevertheless are the biggest contributor to excessive consumption and the depletion of resources. In developed countries, smaller families have tended to be more affluent, and therefore more demanding of greater amounts of consumables. One child born today in the U.S. will consume more and add more pollution to the world than 30 children born in many developing countries. However, rising levels of affluence in the developing world are leading to rising consumer demand and to an

overall dramatic increase in global consumption. Current consumption patterns are already unsustainable, so we must find ways to reduce consumption and to rely upon renewable resources.

Table 6.1: World Population Milestones[86]

World Population reached:	
1 billion in	1804
2 billion in	1927 (123 years later)
3 billion in	1960 (33 years later)
4 billion in	1974 (14 years later)
5 billion in	1987 (13 years later)
6 billion in	1999 (12 years later)

Table 6.2: Population Growth Rates: 1950-2050

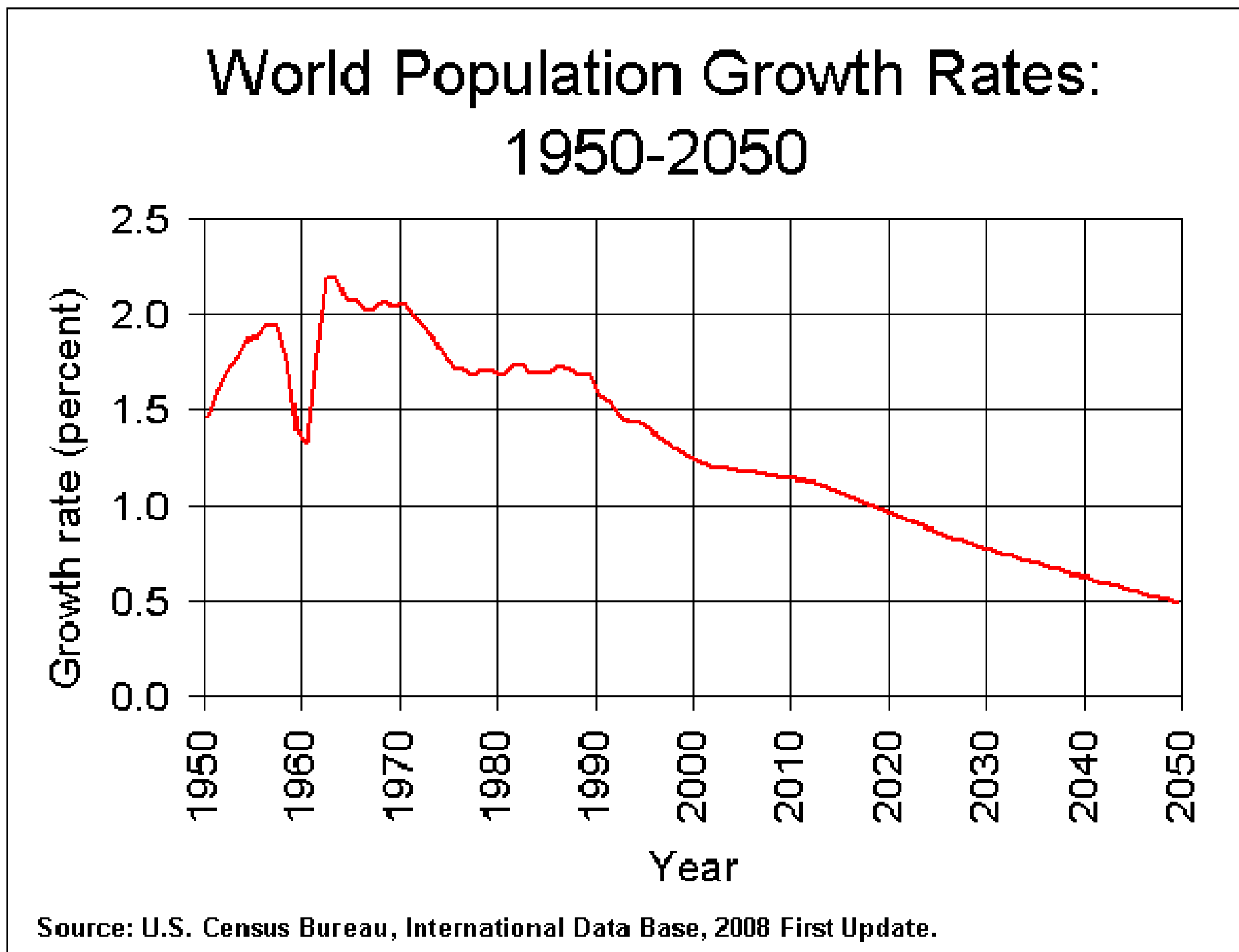

Table 6.3: Estimated Total Fertility for the World, the Major Development Groups, and the Major Areas[87]

Major Area	*Total Fertility (children per woman)*	
	1970-1975	**2005-2010**
World	4.47	2.55
More Developed Regions	2.13	1.60
Less Developed Regions	5.41	2.75
• Least Developed Countries	6.61	4.63
• Other Less Developed Countries	5.25	2.45
Africa	6.72	4.67
Asia	5.04	2.34
Europe	2.16	1.45
Latin America & the Caribbean	5.04	2.37
Northern America	2.01	2.00
Oceania	3.23	2.30

Table 6.4: Total Fertility Rate and Life Expectancy at Birth: World, 1950-2050[88]

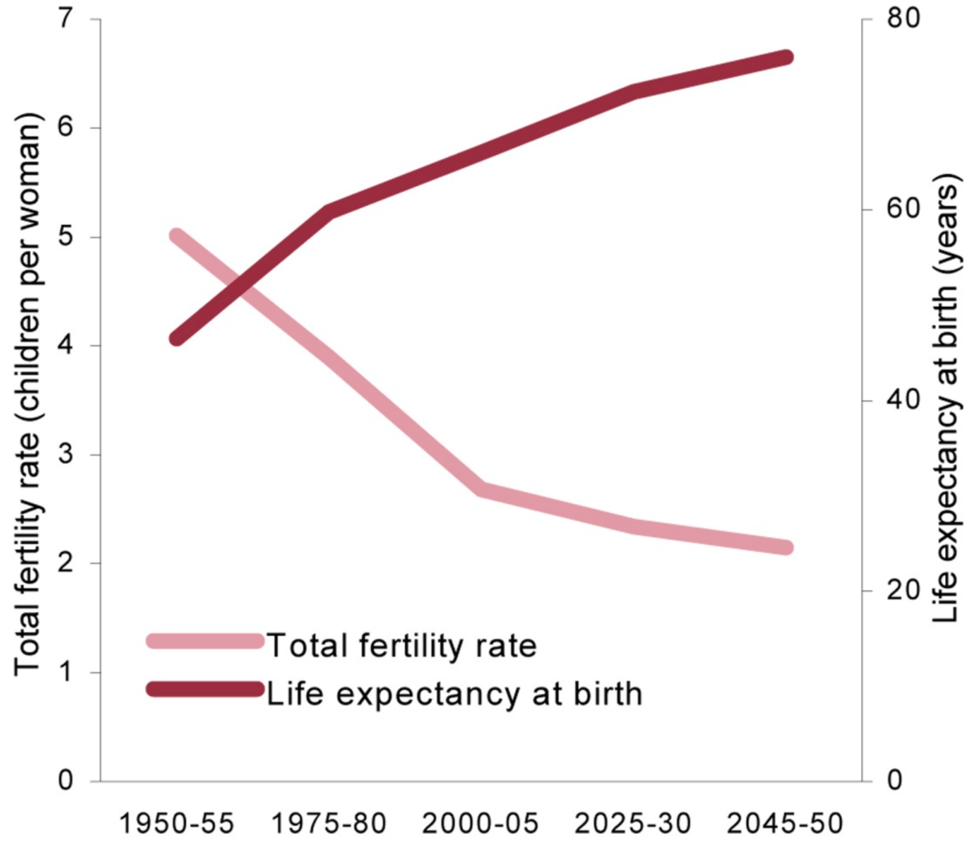

Table: 6.5 International Migrants by Major Area, 1960-2000 [89]

Major Area	Number of international migrants (millions)					International migrants as percentage of population		Distribution by major area (%)	
	1960	1970	1980	1990	2000	1960	2000	1960	2000
World	75.9	81.5	99.8	154.0	174.9	2.5	2.9	100.0	100.0
Developed Countries	32.1	38.3	47.7	89.7	110.3	3.4	8.7	42.3	63.1
Developing Countries	43.8	43.2	52.1	64.3	64.6	2.1	1.3	57.7	36.9

Table 6.6 Calorie Availability: Developed vs. Developing Countries[90]

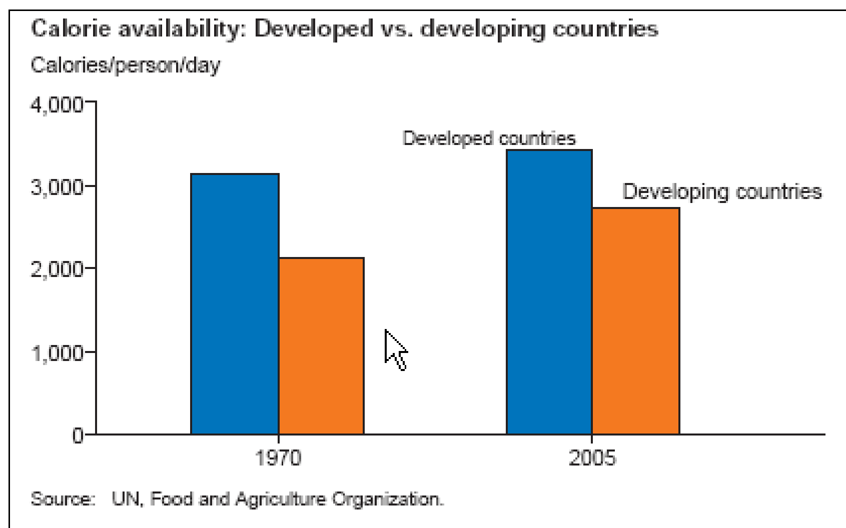

Table 6.7 Types and Effects of Malnutrition, and Number Affected Globally, 2000[91]

Type of Malnutrition	Nutritional Effect	Number Affect Globally (billion)
Hunger	Deficiency of Calories and Protein	At least 1.2
Micronutrient Deficiency	Deficiency of Vitamins and Minerals	2.0-3.5
Overconsumption	Excess of calories often accompanied by deficiency of vitamins and minerals	At least 1.2

Glossary

anthropogenic	Effects, processes or materials that are the result of human activities.
agricultural revolution	A period of rapid change in agricultural production including improved methods of farming and higher yields.
baby boom	Refers to a period of increased birth rates within a certain timeframe, and typically within a specific geographic region.
carrying capacity	The ability of natural environment to sustain the human population.
communist revolution	A Marxist inspired overthrow of a government in order to install a communist type of political and economic system.
deforestation	Ecological term used to describe the rapid conversion of forested land into non-forested land that results in loss of biodiversity.
demographers	Scholars and practitioners who study population and its impacts on society.
demographic transition	Theory/model that links industrial development with declining fertility.
desertification	The gradual transformation of habitable land into desert.
ecological footprint	A measurement of human's impact on the earth by comparing human consumption or resources with the earth's capacity to sustain that consumption.
economic modernization	The transformation of an economy from one that focused on outmoded means of production to one that is able to keep pace with rapid technological and industrial changes.
enteric fermentation	Fermentation that takes place in the digestive systems of ruminant animals, mammals that digest plant-based food by regurgitating semi-digested food and chewing it again.
ethnocentric	Viewing the world primarily from the perspective of one's own culture.
fertility	Measure of reproduction; the number of children born per couple, person, or population.
food security	State of affairs where all people at all times have access to safe and nutritious food to maintain a healthy and active life.
Great Leap Forward	From 1958-1960 in China, it was a political and social plan designed to transform Chinese society from agrarian to modern; however, it was a disaster that left between 14-43 million dead as a result of starvation and related diseases.
greenhouse gases	Gasses, such as carbon dioxide, methane, ozone, and nitrous oxide, that warm the earth's atmosphere by absorbing infrared radiation.
Green Revolution	An effort by scientists (1940s-60s) to engineer fewer improved strains of wheat and corn in order to increase food supplies in developing countries.
indigenous peoples	A particular group of inhabitants of a geographic space whose connections to that space are the earliest known human connections to that land.
Industrial Revolution	Historical period lasting through most of the 19th centuries when the economies of many European nations and the U.S. shifted from an agricultural

	base to a manufacturing one.
locavore	The practice of eating only those foods produced within a short distance of where you live.
malnutrition	A medical condition in which the body receives too few of the nutrients it needs.
Malthusian Catastrophe	A society's return to a subsistence level of existence as a result of overtaxing its available agricultural resources.
mega-cities	Refers to rapidly growing urban areas that have more than ten million inhabitants and are characterized by high levels of crime, poverty, and a combination of formal and informal economies.
migrant	A person who has left her place of residence in order to settle in another country or city.
migration	Human movement from one location to another.
natural increase	The yearly difference in number of births and deaths in a population (birth rate minus death rate).
negative growth rate	Indicates that population figures are declining.
push-pull factors	Forces that drive people away from a place (push) and pull them to a new one (pull).
remittances	Money sent home by workers employed in another country.
replacement levels	The level that needs to be sustained over the long run to ensure that a population replaces itself. For most countries having low or moderate mortality levels, replacement level is close to 2.1 children per woman.
urbanization	The increase in the urban portion of the total population.
water stress	When demand for water outstrips availability.
zero population growth rate	Population neither grows nor declines.

Notes

[1.] Jonathan Swift, "A Modest Proposal for Preventing the Children of the Poor People in Ireland From Being a Burden to their Parents or the Country and for Making them Beneficial to the Public" (Plain Label Books, 1729), 5.

[2.] Quoted in Philip Martin and Jonas Widgren, "International Migration: Facing the Challenge," *Population Bulletin* 57, no. 1 March 2002, http://findarticles.com/p/articles/mi_qa3761/is_200203/ai_n9068737/pg_2.

For the group of 77 see http://www.g77.org.

[3.] Gary Gardner and Payal Sampat, *Mind Over Matter: Recasting the Role of Materials in Our Lives, 144* (Washington, D.C.: Worldwatch Institute December, 1998), 5.

[4.] Interview with Jared Diamond on the radio show "Living on Earth,"*Public Radio International*, January 25, 2008, http://www.livingonearth.org/shows/segments.htm?programID=08-P13-00004&segmentID=3.

[5.] The oldest human fossils were discovered in Ethiopia on the banks of the Omo River by a team led by Richard Leakey in 1967. It wasn't until 2005, however, that new dating techniques revealed that the fossils were 195,000 years old, a figure that pushes back what had previously been believed to be the dawn of modern humans by 35,000 years. The 195,000-year-old date is consistent with findings from genetic research on human populations and it also adds further evidence to support the already widely accepted "Out of Africa" theory of human origins. This theory suggests that modern humans first appeared in Africa and then slowly spread across the entire globe. See Ian McDougall, Francis Brown, John G. Fleagle, "Stratigraphic Placement and Age of Modern Humans from Kibish, Ethiopia," *Nature* 433, no. 7027 (February 17, 2005): 733-736. Hillary Mayell, "Oldest Human Fossils Identified," *National Geographic News* February 16, 2005, http://news.nationalgeographic.com/news/2005/02/0216_050216_omo.html.

[6.] "The World at Six Billion," United Nations Population Division, 1999, 3, http://www.un.org/esa/population/publications/sixbillion/sixbilpart1.pdf.

[7.] "World Population Information," US Census Bureau, http://www.census.gov/ipc/www/idb/worldpopinfo.html.

[8.] Katherine Park, "VIII.16 Black Death," in *The Cambridge World History of Human Disease,* ed. Kenneth F. Kiple (Cambridge, UK: Cambridge University Press, 1993), 613.

[9.] David Lucas, "World Population Growth and Theories," in *Beginning Population Studies,* eds. David Lucas & Paul Meyer, (National Centre for Development Studies, Australia: Asian Pacific Press, 1994), 13.

[10.] "World Population Information," US Census Bureau.

[11.] Joel E. Cohen, *Between Choices and Constraints* (New York, NY: W.W. Norton & Company, 1995), 13.

[12.] Japan's Population Growth Rate: -0.139%. Norway's Population Growth Rate: 0.35%. Central Intelligence Agency (CIA), "Japan," "Norway," last updated May 15, 2008, *The World Factbook*, https://www.cia.gov/library/publications/the-world-factbook/index.html.

[13.] "World Population Information," US Census Bureau.

[14.] "The World at Six Billion," United Nations Population Division, 1999, 4, http://www.un.org/esa/population/publications/sixbillion/sixbilpart1.pdf.

[15.] "The World at Six Billion," United Nations Population Division, 1999, 4, 6, http://www.un.org/esa/population/publications/sixbillion/sixbilpart1.pdf.

[16.] "World Population Prospects: The 2006 Revision," United Nations Department of Economic and Social Affairs, Population Division, 2007, 9, http://www.un.org/esa/population/publications/wpp2006/WPP2006_Highlights_rev.pdf.

[17.] Charles Hirschman, "Population and Society: Historical Trends and Future Prospects," in *The Sage Handbook of Sociology,* eds. Craig Calhoun, Chris Rojek, and Bryan Turner (Thousand Oaks, CA, Sage Publications, 2005), 393.

[18.] Donald G. Kaufman and Cecilia M. Franz, *Biosphere 2000: Protecting Our Global Environment* (Dubuque, Iowa, Kendall/Hunt Publishing, 1993), 156.

[19.] Ibid.

[20.] David J. Campbell, "Assessing Human Processes in Society: Environment Interactions," in *A Guidebook for Integrated Ecological Assessments,* eds. Mark E. Jensen and Patrick S. Bourgeron (New York, NY: Springer, 2001), 424.

[21.] Hirschman, "Population and Society," *The Sage Handbook of Sociology,* 393.

[22.] Ibid, 394.

[23.] Margaret L. Anderson and Howard F. Taylor, *Sociology: Understanding a Diverse Society* (Belmont, CA, Thomson Wadsworth, 2006), 570.

[24.] Hirschman, "Population and Society," *The Sage Handbook of Sociology,* 394.

[25.] Nancy Birdsall and Steven W. Sinding, "How and Why Population Matters: New Findings, New Issues," in *Population Matters,* eds. Nancy Birdsall, Allen C. Kelley, and Steven W. Sinding (Oxford, UK: Oxford University Press, 2001), 14.

[26.] Ibid.

[27.] Richard H. Robbins, *Global Problems and the Culture of Capitalism* (Needham Heights, MA: Allyn & Bacon, 1999), 153.

[28.] Ibid, 167-169.

[29.] Albert Keidel, “China’s Economic Rise—Fact and Fiction,” *Policy Brief No. 61,* Carnegie Endowment for International Peace, July 2008, http://www.carnegieendowment.org/publications/index.cfm?fa=view&id=20279&prog=zch.

[30.] United Nations Population Division, “Introduction: The Dynamics and Consequences of Population Ageing,” *World Population Ageing: 1950-2050*, 1, http://www.un.org/esa/population/publications/worldageing19502050/pdf/7introduction.pdf.

[31.] United Nations Population Division, “Chapter I: Demographic Determinants of Population Ageing,” *World Population Ageing: 1950-2050*, 6-7, http://www.un.org/esa/population/publications/worldageing19502050/pdf/8chapteri.pdf.

[32.] United Nations Population Division, “Chapter II: Magnitude and Speed of Population Ageing,” *World Population Ageing: 1950-2050*, 11-12, http://www.un.org/esa/population/publications/worldageing19502050/pdf/80chapterii.pdf.

[33.] United Nations Population Division, “Chapter III: Changing Balance between Age Groups,” *World Population Ageing: 1950-2050*, 15, http://www.un.org/esa/population/publications/worldageing19502050/pdf/81chapteriii.pdf.

[34.] United Nations Population Division, “Introduction: The Dynamics and Consequences of Population Ageing,” *World Population Ageing: 1950-2050*, 1, http://www.un.org/esa/population/publications/worldageing19502050/pdf/7introduction.pdf.

[35.] “The State of the World’s Refugees 2006,” UNHCR, http://www.unhcr.org/publ/PUBL/4444d3c043.html.

[36.] United Nations Population Division, “International Migration 2006” (UN Wall Chart), http://www.un.org/esa/population/publications/2006Migration_Chart/Migration2006.pdf.

[37.] Ibid.

[38.] Ibid.

[39.] “State of World Population 2007: Unleashing the Potential of Urban Growth,” United Nations Population Fund (UNFPA), 1, http://www.unfpa.org/swp/2007/presskit/pdf/sowp2007_eng.pdf.

[40.] Ibid.

[41.] “World Urbanization Prospects: The 2007 Revision,” United Nations Population Division, 4, http://www.un.org/esa/population/publications/wup2007/2007WUP_ExecSum_web.pdf.

[42.] "State of World Population 2007: Unleashing the Potential of Urban Growth," United Nations Population Fund (UNFPA), 55, http://www.unfpa.org/swp/2007/presskit/pdf/sowp2007_eng.pdf.

[43.] Ibid.

[44.] See John Iliffe, *Africans: The History of a Continent* (Cambridge, UK: Cambridge University Press, 1995), 21, 27 and John Iliffe, *The African Poor: A History* (Cambridge, UK: Cambridge University Press, 1987).

[45.] Thomas R. Malthus*, Essay on the Principle of Population,* ed. Geoffrey Gilbert (New York, NY: Oxford University Press, 1999).

[46.] David Lucas, "World Population Growth and Theories," in *Beginning Population Studies,* eds. David Lucas & Paul Meyer (National Centre for Development Studies, Australia: Asian Pacific Press, 1994), 22.

[47.] Ron Nielsen, *The Little Green Handbook* (New York, NY: Picador, 2006), 52.

[48.] Shahla Shapouri and Stacey Rosen, "Global Diet Composition: Factors Behind the Changes and Implications of the New Trends," in *Food Security Assessment, 2007* (Washington D.C.: United States Department of Agriculture, July 2008) 28, http://www.ers.usda.gov/Publications/GFA19/GFA19.pdf.

[49.] Amartya Sen*, Poverty and Famines: An Essay on Entitlement and Deprivation* (Oxford, UK: Oxford University Press, 1981).

[50.] Yaa Ntiamoa-Baidu, "Chapter One: Introduction," in *Wildlife and Food Security in Africa*, Food and Agriculture Organization of the United Nations, http://www.fao.org/docrep/w7540e/w7540e03.htm.

[51.] Gary Gardner and Brian Halweil, *Underfed and Overfed: The Global Epidemic of Malnutrition,* Worldwatch Paper No. 150 (Washington DC: Worldwatch Institute, March 2000), 7.

[52.] Ibid, 8.

[53.] Ibid, 13.

[54.] Ibid, 14.

[55.] Michael L. McKinney and Robert M. Schoch*, Environmental Science: Systems and Solutions* (Sudbury, MA: Jones and Bartlett Publishers, 2007), 315-317.

[56.] Audrey H. Ensminger and James E. Konlande, "Energy Required for Food Production," in *The Concise Encyclopedia of Foods and Nutrition (*Boca Raton, FL: CRC Press, 1995), 312.

57. Manno, Jack. *Privileged Goods: Commoditization and Its Impact on Environment and Society* (Boca Raton, FL: Lewis Publishers, 2000), 89.

58. Audrey H. Ensminger and James E. Konlande, "Energy Required for Food Production," 311.

59. David Pimentel and Marcia H. Pimentel, *Food, Energy, and Society* (Niwot, CO.: University Press of Colorado, 1996.), 252.

60. Ibid, 251.

61. See for example the American Public Broadcasting System documentary series Independent Lens film *Black Gold*. For similar negative impacts see Herbert Sauper's documentary *Darwin's Nightmare* (2006) about the global Tilapia market and Tanzania.

62. Peter Singer and Jim Mason, *The Way We Eat* (New York, NY: Rodale, 2006).

63. Robbins, *Global Problems and the Culture of Capitalism,* 14.

64. Ibid, 15-22.

65. Michael Renner, "Moving Toward a Less Consumptive Economy," in *State of the World 2004: The Consumer Society*, eds. Erik Assadourian, Christopher Flavin, Hilary French, et al. (New York, NY: W.W. Norton & Co., 2004), 112 and Gary Gardner, Erik Assadourian, and Radhika Sarin, "The State of Consumption Today," in *State of the World 2004: Special Focus: The Consumer Society* (New York , NY: W.W. Norton & Co., 2004), 15.

66. Jared Diamond, "What's Your Consumption Factor," *New York Times*, January 2, 2008, http://www.nytimes.com/2008/01/02/opinion/02diamond.html?pagewanted=1.

67. Victoria D. Markham, *U.S. National Report on Population and the Environment* (New Canaan, CT: Center for Environment and Population, 2006), 4.

68. Sandra Yin, "Lifestyle Choices Affect U.S. Impact on the Environment," Population Reference Bureau, 2006, http://www.prb.org/Articles/2006/LifestyleChoicesAffectUSImpactontheEnvironment.aspx?p=1.

69. Ibid.

70. Victoria D. Markham, *U.S. National Report on Population,* 7.

71. Sandra Yin, "Lifestyle Choices Affect U.S. Impact on the Environment,"

72. Victoria D. Markham, *U.S. National Report on Population,* 8.

73. Ibid, 7.

[74.] "Summary of Listed Species." U.S. fish and Wildlife Service, Threatened and Endangered Species System, October 19, 2008, http://ecos.fws.gov/tess_public/TESSBoxscore

[75.] Alex Kirby, "Biodiversity: The Sixth Great Wave," *BBC News*, October 1, 2004, http://news.bbc.co.uk/2/hi/science/nature/3667300.stm.

[76.] Victoria D. Markham, *U.S. National Report on Population*, 8.

[77.] Ron Nielsen, *The Little Green Handbook* (New York, NY: Picador, 2006), 62.

[78.] Ibid, 78.

[79.] Lester Russell Brown, Linda Starke, *State of the World 1998* (New York, NY: Norton, 1998), 5

[80.] Joyhn D. Reynolds, Nicholas K. Dulvy, and Callum M. Roberts, "Exploitation and other Threats to Fish Conservation." *Handbook of Fish Biology and Fisheries* (Malden, MA: Blackwell, 2002), 319.

[81.] Daniel Howden, "Deforestation: The Hidden Cause of Global Warming," *The Independent,* May 14, 2007, http://www.independent.co.uk/environment/climate-change/deforestation-the-hidden-cause-of-global-warming-448734.html.

[82.] *Economic and Social Commission for Asia and the Pacific Region Annual Report for 2005* United Nations, 2006, 8-12, http://www.unescap.org/61/English/E61/Annual%20Report/E_ESCAP_1359.pdf.

[83.] See Richard Jackson and Neil Howe, "The Graying of The Middle Kingdom The Demographics and Economics of Retirement Policy in China," Center for Strategic and International Studies, Global Ageing Initiative, 2004, http://www.csis.org/media/csis/pubs/grayingkingdom.pdf and U.S. Department of Commerce, "Bureau of the Census International Brief: Old Age and Security Reform in China," November 1995, http://www.census.gov/ipc/prod/ib95-1.pdf.

[84.] W. John Hoffmann, Michael J. Enright, *China into the Future: Making Sense of the World's Most Dynamic Economy* (Hoboken, NJ: John Wiley & Sons, 2008), 143.

[85.] Gerhard Heilig, "Can China Feed Itself? A system for Evaluation of Policy Options," International Institute for Applied Systems Analysis Papers, Vienna, Austria, 1999, http://www.iiasa.ac.at/Research/LUC/ChinaFood/index_m.htm.

[86.] "The World at Six Billion," United Nations, 8, http://www.un.org/esa/population/publications/sixbillion/sixbilpart1.pdf.

[87.] "World Population Prospects: The 2006 Revision," United Nations Department of Economic and Social Affairs, Population Division, 2007, 9, http://www.un.org/esa/population/publications/wpp2006/WPP2006_Highlights_rev.pdf.

[88.] United Nations Population Division, "Chapter I: Demographic Determinants of Population Ageing," *World Population Ageing: 1950-2050*, 5, http://www.un.org/esa/population/publications/worldageing19502050/pdf/8chapteri.pdf.

[89.] United Nations Population Division, "International Migration 2006" (UN Wall Chart), http://www.un.org/esa/population/publications/2006Migration_Chart/Migration2006.pdf.

[90.] *Food Security Assessment, 2007* (Washington D.C.: United States Department of Agriculture, July 2008) 28, http://www.ers.usda.gov/Publications/GFA19/GFA19.pdf.

[91.] Gary Gardner and Brian Halweil, *Underfed and Overfed: The Global Epidemic of Malnutrition,* Worldwatch Paper No. 150 (Washington DC: Worldwatch Institute, March 2000), 7.