Global Affairs and Population Issues in the Twenty-First Century

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INTRODUCTION

The purpose of this study is to analyze the effects of population change, specifically a global decrease in fertility rates on the short-term and long-term prospects for a more peaceful and equitable global system. The study first reviews global demographic history, and how population has influenced changes in agriculture, technology and politics. The section on geopolitics looks at the current distribution of power in the emerging multipolar system, the possible implications of changes in relative regional populations, and the instabilities which could arise due to increased population pressures on food supplies. The continuing dilemma posed by refugees is also considered. The third section assesses the evolution and current situation of the global economy, and the continuing struggle to raise agricultural productivity in the face of environmental stresses. Likewise, the problems associated with the aging of societies in the MDC's, and possible policy implications are considered. Finally, analysis on the short-term (to 2010) and distant (to 2050) prospects for the global system and international affairs concludes this study.

The study is not primarily concerned with a review of demographic methods or statistics. The purpose is to use Eberstadt's demographic analysis of lowered fertility as a given, and to examine the effects of population change on the global system.[1] Thus, this is primarily an analysis of the global system and its relationship to population change, historically and in the new century.

Clearly, any study of global scale changes will contain inherent limitations. This effort is no exception. The realities of local, national and regional scale change could, and often will, differ from the view of these issues from a global perspective. Nevertheless, the fundamental value of a holistic approach to the geography of global political and economic shifts, and the fundamental importance of human population patterns in driving such changes, is justification enough for such a project.

Global Demographic History

Throughout most of its demographic history, the human race experienced a slow propagation of its species. Yet over the past 200 years, major revolutionary shifts in human culture—food production, social organization and technology—resulted in exponential increases in population growth.

The Cultural Revolution in tool making and the use of fire began about one million years B.P., with the hominid ancestor, homo erectus. From this point to the evolution of Homo sapiens at the end of the Paleolithic era, human population grew to about 5.32 million by 10,000 B.P. At about this time, the Agricultural Revolution began, perhaps

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1 Nicholas Eberstadt, "World Population Implosion," The Public Interest 12 (1997): 3-22.

first in the highland rim of the Fertile Crescent in Southwest Asia, then either diffused from this hearth or developed independently in other culture hearths of the world, notably Egypt, the Indus River Valley, China and Southeast Asia. The demographic ramifications of these developments were profound. By about 2000 B.P., global population had increased to about 250 million. At this time, more sophisticated techniques of food production such as wet-rice agriculture and improved socio-political organization of society and the landscape resulted in an expansion of carrying capacities. Agricultural civilization also spread to areas previously inhabited by hunter-gatherer groups. This also expanded the numbers of the human family. Nevertheless, growth was slow by today's standards, at barely 0.05 percent, annually.[2]

It was the third social shift, the Scientific-Industrial Revolution, that led to the dramatic lowering of death rates characteristic of societies experiencing rapid population growth. Thus, by the 1820s world population attained the one billion mark. The addition of the second billion took a mere 110 years, and the 1930 population of two billion doubled in only 45 years to four billion people in 1975. Only 17 years were needed to top the five billion mark. These logarithmic patterns of growth are represented in the table below. [3]

Table 1: World Population Growth, 1820-2000

Population	Year
1 billion	1820
2 billion	1930
4 billion	1975
5 billion	1987
6 billion	2000 (estimated)

As some societies experienced rapid industrialization the dynamics of their fertility, mortality and migration also changed. Crude death rates fell due to improvements in sanitation and medicine, yet fertility rates remained high. This resulted in accelerated population growth. In time, however, due to increased migration to urban areas, changes in social values and the availability of birth control devices, fertility rates decreased and population growth slowed in the industrialized countries, though a few countries such as Australia and the USA maintained population growth rates that were relatively high due to immigration. This decrease was particularly noticeable by the postwar period, with some European states and Japan recording fertility rates at sub-replacement level by the 1990s.[4]

2 Gary L. Peters and Robert P. Larkin, *Population Geography* (Dubuque, Iowa: Kendall/Hunt Publishers, 1997), 4-7; Massimo Livy-Bacci, *A Concise History of World Population* (Oxford: Blackwell Publishers, 1997), 37-38.

3 Peters and Larkin, 4-7.

4 Peters and Larkin, 9, 108-110, 136-140.

The Demographic Transition Model

The transition to lower rates of natural increase is given a theoretical structure in the four-stage Demographic Transition Model. Stage one reflects the fact that for most of human history high birth rates were balanced by high rates of mortality due to disease, warfare, poor hygiene and inadequate diet. A region or country in stage one experiences modest rates of population growth. However, a gradual process began in England and Wales in about 1750 in which lower death rates, yet unchanged high birth rates, produced a subsequent explosion in population. This stage two pattern was evident during the early years of European urbanization, when infant mortality rates dropped sharply but fertility rates remained high. As industrialism diffused to other European societies, and the USA and Japan by the late nineteenth century, higher rates of natural increase became the rule in these countries. Moreover, the USA absorbed large numbers of immigrants from Eastern and Southern Europe during this period.[5]

Eventually, population growth slows as urbanization imposes increased costs on raising children. Changing social values initiates a redefinition of the role of women, and the development of social welfare systems reduces the necessity to have large families. In a four-stage model, Stage Three is characterized by even lower crude death rates and rapidly falling crude birth rates. Total fertility rates are greatly lowered, although birth rates decrease less rapidly due to the large numbers of women in their child-bearing years, a legacy of previously high fertility rates. In Stage Four, the industrializing societies experience low CDR's and CBR's, and fertility may drop to sub-replacement levels. This has already occurred in high cost of living societies such as Italy and Japan. There is at least one major caution for employing this theory as a paradigm to view population growth in changing societies: those countries which industrialized later, such as the USA and Japan, moved through the four stages more rapidly than the earliest industrialized societies such as England, which had a two-century pattern of demographic evolution. This was even more apparent in the late twentieth century for new industrialized countries (NIC's). Some societies such as China apparently experienced dramatic decreases in both CDR's and TFR's due to the ideological commitment of the ruling party to improved health care and lowered rates of population growth. Most areas of China are now well into Stage Three of the demographic transition, with urban areas in Stage Four. This pattern is also emerging in some Southeast Asian societies, though generally without intensive government coercion.[6] Thus, the Demographic Transition Model does help us to begin to understand the differing geographical patterns of population growth by country and region. It helps us to disaggregate the overall global population figures and to see particular changes at a more local geographic scale.

Despite these changes, global rates of population growth in the last several decades, particularly within the LDC's, have given rise to considerable pessimism among many demographers, particularly neo-Malthusians.[7] Most demographers and biologists in this school of thought believe that the biosphere's ecological fragility will not sustain continued long-term increases in human population, and that massive natural checks on population growth are imminent. The environmental problems of deforestation and accompanying soil erosion and desertification are seen as limiting humanity's ability to increase agricultural output, then bringing about a demographic crash. Moreover, the rapid indus-

5 Peters and Larkin, 9, 90-93.

6 Peters and Larkin, 90-94, 136-145; Hou Wenrou, "Population Policy in China." *China's Population: Problems and Prospects.* Ed. Liu Zheng, Song Jian, et.al (Beijing: New World Press, 1981).

7 Paul Ehrlich, *The Population Bomb* (New York: Ballantine Books, Inc., 1968).

trialization of societies with huge populations, such as China and India, will dramatically increase the emission of CO2 and greenhouse gases into the atmosphere, thereby exacerbating the effects of global warming. This could lead to coastal flooding that will decrease the amount of land available for agricultural use in the vital lowlands and alluvial floodplains upon which humans are so dependent for food production and living space. In addition, increased temperatures might decrease agricultural yields in the continental grasslands of North America and Eurasia, due to increased drought. Clearly, the issue of population growth is intimately connected with food production, living space and ecological sustainability.[8]

Geopolitics, Population and the Current Global System

The rapid decline of communism and the end of the bipolar world order has allowed policy makers to focus on the most fundamental divide in today's world, that between the northern core and southern periphery. In addition, the USA remains the world's most significant power, though this situation may gradually change toward a system of greater multi-polarity. Concurrently, the changing relative population size of different regions and the crises of global ecology are strongly affecting the short-term and long-term prospects for a successful human-environment relationship.

The current system is still largely dominated by the USA. This is hardly surprising, given that its main opposition during the Cold War, the USSR devolved into fifteen separate political entities in the early 1990s. Consequently, the U.S. finds itself at the apex of world politics, the only state that can be classified as a comprehensive global power. In equipment, quality of training, and leadership, the U.S. Armed Forces are unmatched. The panoply of airlift and seaborne logistical assets at the disposal of its military allows the USA to project power to distant points on the globe more rapidly and effectively than any other state by far. Moreover, American capabilities in computer software and other information technologies have been applied to create military hardware of unprecedented sophistication and lethality. The smart systems displayed during the Gulf War are the fruits of these efforts. Finally, the U.S. lead in space and satellite technology provides its leaders with an electronic intelligence capability that is invaluable in assessing the strengths and weaknesses of other states.[9]

Likewise, the depth, breadth and multi-faceted nature of the U.S. economy are the foundation for the country's military strength and overall power. The critical mass of large territory, a multitude of climates and soils, and the world's third largest population are combined with a cultural-economic commitment to creativity, wealth-creation and technological innovation. Despite earlier predictions of decline, the USA continues to be the major player in the global economy, accounting for approximately thirty percent of world manufacturing output. American transnational corporations are entrenched in every region of the world, in virtually every conceivable industry. The American dollar is the currency of choice for the world financial markets, providing a monetary refuge during periods of market uncertainty. Indeed, the current crisis in the emerging markets of Southeast Asia and Russia, combined with the economic malaise in Japan, only serve to highlight the primacy of the American economy, and its role in sustaining U.S. status as a comprehensive global power.[10]

8 Peters and Larkin, 88-89.

9 Zbigniew Brzezinski, *The Grand Chessboard* (New York: Basic Books, 1997), 23-24; Paul Kennedy. *Preparing for the Twenty-First Century* (New York: Vintage Publishers, 1993), 291-292.

10 Brzezinski, 23-27.

Given these realities, some scholars view the current system as being characterized by unipolarity.[11] Yet, this conclusion is highly problematic, as the fluid process of international affairs is already evolving into a more multi-polar order. Particularly notable is the continuing diplomatic rapprochement between the two Eurasian giants, Russia and China. Both states are trying to develop strategies to counteract what they see as an American effort to dominate the global system. Though some scholars believe that the USA can achieve this status, most treat such statements with alarm, believing that other key powers in the global order will not tolerate an effort by one power toward hegemony. Rather than devising strategies using the outdated approach of a static geopolitics, foreign policies should be devised which encourage equilibrium in the global system, and reflect an understanding of spatial processes, which is the key to creating a geography of peace.[12] Current trends in geopolitics indicate that such an equilibrium could emerge much sooner than some analysts previously expected.

Key Power Centers in the Current Global System

The European Union has emerged as a single unit on the world stage, certainly in economic terms, and increasingly in political affairs as well. Since the signing of the Maastricht Treaty that created the EU from the earlier European Community, the economies of the region have continued their march toward monetary union. With the formal introduction of the common currency or ECU by eleven countries in 1999, the EU will finally place the capstone on its efforts to build an internally coherent and truly European economy.[13]

Likewise, 375 million consumers of the European Union form the world's largest single economic bloc, with the highest levels of human development in the world. The European concern for human rights and economic justice gives these societies a balance between freedom and equality that no other region can match.[14] Despite these admirable qualities, the EU does face real challenges. Not the least of these is the aging of the population. Germany and Italy already have the highest median ages of any society in the world, at about 40. By 2050, Germany will have a median age of 55, and Italy an incredible 58 years. About 40% of Italy's population will be 65 years of age or older. By mid-century, this will result in dependency ratios of 60 for Germany and 80 for Italy, due to the huge elderly population.[15] The burden of caring for this gray population will severely test the financial resources and ingenuity of these states, and the EU as a whole. For example, the social benefits of the states of the EU might have to be diminished, or taxes on the working population increased to potentially intolerable levels. Either way, governments have a task that is politically unenviable. One possible solution is to increase the percentage of the working population in the EU countries by allowing a steady level of legal immigration from the other regions, notably North Africa and Eastern Europe. However, such a policy is likely to meet fierce opposition from the political Right, particularly in Germany and France. Thus far, the Germans have not succeeded in constructing a culturally-based, non-racial definition of citizenship. If such cultural chauvinism and ethnic pride prevail

11 Brzezinski, 23.

12 Saul B. Cohen, "Geopolitics in the New World Era: A New Perspective on an Old Discipline," *Reordering the World: Geopolitical Perspectives on the Twenty-First Century*, eds. George J. Demko and William B. Wood (Boulder CO: Westview Press, 1994), 1-31.

13 Paul Knox and John Agnew, *The Geography of the World Economy* (London: Edward Arnold, 1994), 389-398.

14 Kennedy, 255-259.

15 Eberstadt, 11, 17-18.

in the EU states, then Europe's bright future could be jeopardized. Finally, European economic strength still tends to be spatially concentrated in the southern UK, northern France, the Rhine valley of Germany and northern Italy. This has necessitated intensive investment in the economically peripheral areas such as Ireland, Spain, Portugal and Greece. Nevertheless, these efforts to bring greater spatial cohesion to Europe will strengthen its future prospects.[16]

Japan, the world's second largest economy, is a traditional, yet modern society facing difficult, interconnected demographic, economic and cultural challenges. The Japanese are currently grappling with the same issue of a graying population that bedevils Germany and Italy. The current median age of Japan is now 40, about the highest in the world. By 2050, the median age could reach 53 years, with a dependency ratio of 64, even higher than that projected for Germany.[17] Japan's difficulties are discussed in more detail below.

The Russian Federation will eventually emerge from its current tortured efforts to build a more viable political economy as an important global player, if for no other reason than the fact of its territorial size and population. The essential geopolitical reality is that Russia covers most of northern Eurasia, and borders more states than any other political entity. The diversity and amount of its mineral and fossil fuel resources make it a crucial player in Europe's economic geography, and potentially to the economies of Japan, China and Korea as well.[18] Moreover, it is a nuclear weapons state, and a permanent member of the Security Council of the United Nations. Interestingly, Russia has recently been guided by leaders such as Yevgeny Primakov, a Soviet-era geopolitician, and currently by President Vladimir Putin, who seems determined to restore Russia's power and influence in Eurasia. Therefore, it is difficult to agree with those who believe that Russia can be cajoled and intimidated into accepting the dominance of another state on the Eurasian landmass.

Nevertheless, this is not to say that Russia is not facing severe socio-economic challenges. An increase in infant mortality and a decrease in life expectancy, notably among males, is indicative of the continuing stresses inherent in post-Soviet Russia.

China, occupying the southeastern quadrant of Eurasia, is a state facing extreme challenges as it strives to maintain a sustainable balance between population, environment and resources. However, like Russia, China also possesses territorial size, an educated corps of technocrats and nuclear capability. Like Russia, it is also a permanent member of the UN Security Council. Although China's myriad socio-economic and environmental difficulties will prevent Beijing from attaining the status of a true global power, China is a dominant regional military presence in East Asia. Likewise, the PRC is now a global player in diplomacy, and its disapproval of what it perceives to be U.S. efforts at "hegemony" make China's presence on the UN Security Council all the more important. In the 1990s, the Chinese have continued their efforts at a strategic rapprochement with the Russian Federation. It is fascinating to note that unlike the connection between the two communist powers in the 1950s, in the current relationship, China is the senior partner. Beijing hopes that this diplomatic initiative will help to provide greater balance in international relations, and prevent a recurrence of the dilemma of the late 1960s, when the PRC was strategically and ideologically isolated, and came close to war with its northern neighbor. Thus, the current policy can best be understood as an effort to avoid the unfavorable systemic conditions of the past. China is, therefore, working steadily to enhance

16 Kennedy 273-276; Knox and Agnew, 389-398.
17 Eberstadt, 11, 17-18.
18 D.Yergin and T.Gustafson, *Russia 2010* (New York: Vintage Books, 1994), 238-264.

its status as a global power in the military, economic and political spheres.

By maintaining a stable relationship with Russia, China is able to concentrate the energies and resources of the state on achieving regional military and political predominance on the mainland of southeastern Eurasia, and potentially, the adjacent seas. These geopolitical goals have been the traditional concerns of China's rulers since the Han dynasty (208 B.C.-220 A.D.). Nevertheless, some recent commentaries have actually argued for a new policy of containment toward China, seeing that state's efforts as a drive to superpower status.[19] Other observers believe that China is essentially a regional power with limited geopolitical aspirations, based largely on historically-based geographical and cultural factors.[20] Whatever the true intentions and capabilities of China, there seems to be little doubt that the future direction of the PRC, and the response of the global community toward it, will play a large role in determining whether the next century will witness systemic political turbulence, or greater political cooperation.

The Geopolitics of Population and Environment

Despite the attention on the emerging multipolar order by think tanks and foreign policy institutes, a more fundamental global fissure threatens peace, security and the human relationship to the biosphere. This is the "geopolinomic" division of the earth into a developed core and an underdeveloped periphery. Within this context, population issues are a key dynamic in global affairs. Although fertility rates in developing countries are falling, the elevated rates of recent decades result in a "demographic momentum," and consequent continuation of population increase.[21] Given these demographic verities, the first decade of the twenty-first century will witness an intensification of population pressures in the following areas: 1) regional population ratio changes and geopolitical power, 2) the crises of population, food and global ecology, 3) an increase in migration at all scales, at least in the next several decades.

The most notable spatial change related to fertility rates is the increasing imbalance in regional population ratios. The pattern of very low fertility in the MDC's at 1.7 in the early 1990s and the continued higher relative fertilty rates of the LDC's of about 3.3, have resulted in increasing regional population imbalances. Some of the regional implications are quite striking, especially in terms of population ratios. For example, in 1995, the ratio of population between the LDC's and MDC's was 4 to 1. By 2050, the ratio will be 7 to 1. An excellent regional scale example is that of Africa (in total) and Europe (including Russia). The 1995 demographic ratio was about even. By 2050, the African population will outnumber Europe by 3 to 1. Viewed by rank order, in 1950, six of the twelve largest countries by population were in the developed regions. By 1995, the number had dropped to four, and by 2050, only the United States will make the top demographic twelve. Societies such as Iran, Ethiopia and Congo-Zaire will be more populous than any single European country. Moreover, Nigerians will outnumber Americans and no European country will be as populated as the Philippines.[22]

What are the implications of these imbalances? In light of the ecological frailties of many ecosystems in the developing world, these changes cannot be positive. Consider the plight of the Sahel and the Horn of Africa. In these regions, a combination of interrelated human and physical factors, such as climatic change, civil war and population

19 Richard Bernstein and Ross Munro, "The Coming Conflict with America," *Foreign Affairs*, 76n2, 1997, 18-32.
20 Robert Ross, "Beijing as a Conservative Power," *Foreign Affairs*, 76, no 2 (1997): 33-44.
21 Eberstadt, 9.
22 Eberstadt, 10-11.

pressure cause great stresses, which too often lead to famine and misery.[23]

Another implication of these altered regional ratios is the possible shift of geopolitical power southward to the LDC's. States such as China, India, Nigeria and Brazil are dominant in their respective regions. However, these large, populated states are now buffeted by the intense pressures of decreasing arable land, pollution, hyper-urbanization, and consequent problems of economic stress and political unrest. These pressures will continue to intensify in the near future, due to demographic momentum and the increasing use of technology, and the higher rates of consumption, which accompany modernization. Yet, despite these problems, India, Nigeria and Brazil are future candidates for permanent seats on the UN Security Council. China, already a permanent member, is playing an increasingly assertive role in world affairs.

A related question is whether the aging of populations in the MDC's will lead to a possible erosion of their geopolitical power relative to each other and the LDC's. All of the developed states are likely to maintain their status as wealthy societies. But countries that experience extremes in demographic aging, such as Germany, Italy and Japan, will face a serious threat to their current status within the global system. In 1995, the global median age was 25, but for these prosperous societies, median age was about 40. Providing care for large elderly populations will tax the ingenuity of policy makers in these countries.[24]

Japan is likely to experience a decline in its relative power status, in no small part due to demographic aging. The male-centered corporate culture and the reluctance of women to marry into traditional homemaker roles has led to a precipitous decline in birthrates in a society with an extremely high cost of living. Consequently, the population of those who are 65 and older exceeds the figure for children under age 15. Given the ineffective response of a male-dominated government to enact public policies more friendly to working mothers, and a culture that frowns upon a career and child raising, this trend is unlikely to change. By 2007, the population will begin to decline in absolute terms. Thus, a combination of a larger aged population and high dependency ratios will likely transform Japan into a state preoccupied with domestic welfare issues. The Japanese will likely maintain a role in the global community, in foreign aid, and development issues. Its manufacturing power is still considerable, and with the size of their economy, the Japanese will retain a voice in economic issues. But Japan is unlikely to ever evolve into a comprehensive global power.[25]

In the next decade, the crisis of population and food production will intensify in certain sub-regions of the world. This is a certainty in the Sahel and the Horn of Africa, where drought and population pressures induce soil erosion from overgrazing, deforestation and subsequent desertification. Where these specific issues interface with intra-state ethnic and religious violence, famine will often result, as in southern Sudan in 1998. If states in vulnerable regions suffer disintegration, as in Somalia in 1993, then the peoples of these states also will experience localized or sub-regional famines. Sub-Saharan Africa is the macro-region most vulnerable to these threats, given its fragmented political geographies and local population pressures on marginally productive lands.[26]

23 Demko, 179-180; Timothy Weiskel, "Vicious Circle: African Demographic History as a Warning," *Harvard International Review;* Reprinted in *Global Issues* 95/96, ed. Robert M. Jackson (Guilford Connecticut: Dushkin Publishing Group).

24 Eberstadt, 11.

25 Akiko Doi and Kim Willenson, "The Birthrate and the Bust: How Career Choices and Fewer Babies are Undermining Japan's Future," *The Washington Post,* 26 July, 1998: C1-2.

26 Demko, 179-180; Weiskel, 12-16.

Many other locales in the LDC's are also experiencing chronic hunger, which could worsen with continued population growth and economic decline in the near future. Rural areas of Java and Sumatra, among the most densely populated areas of the world, are experiencing renewed hunger due to the meltdown in that country's economy. Indeed, throughout the LDC's, the most vulnerable sectors of these societies will face the challenge of securing adequate food.

During the 1990's, international refugee flows have been greater than at any other time since World War II. In 1993, an estimated 18 million refugees were living outside of their country of birth, with an equal number displaced within their country of birth. The head of the United Nations High Commission for Refugees has identified this crisis as a threat to global stability, and few governments would disagree. The list of regional areas and countries is predictable, based on ecological devastation, political strife and famine: the Sahel, the Horn of Africa, Afghanistan, Angola and Mozambique have all been prominent crisis localities. As system entropy increases early in this new century, the multiple crises of the "hunger belt" will command the attention of the global community. The vicious circle of intra-LDC refugee flows will strain the apparatus of humanitarian aid to its limits, thereby increasing the strains on the global system.[27]

Thus, even the most optimistic projections for the decline in global fertility rates will not be enough to forestall an increase in global scale suffering in the first decade of the twenty-first century. Likewise, the large number of females giving birth in many developing countries is currently resulting in demographic momentum, i.e. a continued increase in population growth, and associated pressures on vulnerable ecologies and societies.

All of this is not to say that the entire developing world is threatened by demographic momentum, and the neo-Malthusian vision of famine and ecological destruction. As George Demko reminds us, one of the hazards of global-scale studies is the lack of insight into local variations in balances between population and arable land, and the discrepancies in patterns of land ownership and government commitment to social and economic rights. Clearly, some developing societies will adapt to the challenges ahead and achieve certain levels of sustainability in the next century (e.g. Botswana, Chile). Just as clearly, others will fail to meet these challenges (Sudan, Afghanistan). What is necessary is a regional and sub-regional approach, which closely analyzes local conditions of population and ecological balance, as well as political economy.[28]

An estimated 500 million people are victims of chronic malnourishment, or "silent hunger," which weakens immune systems and contributes to deaths from disease. In addition, child development is stunted, affecting the ability of people to contribute to their societies in a productive manner. These are the people who will challenge the resources and ingenuity of Oxfam, UNICEF, the World Bank and all of the IGO's and NGO's of goodwill concerned with those who are struggling to build livable, sustainable societies. Although enough food reserves exist to feed the planet's population, the spatial economic and political barriers to the distribution of food to those most in need is formidable. Thus, in the short-term, greater coordination between states (where viable governments exist) UN agencies and NGO's will be necessary to alleviate suffering and in the long run to preserve or create a stable balance between arable land and population.[29]

27 Demko, 183-185.
28 Demko, 179-180.
29 Demko, 185-186.

The increasing short-term (to 2010) entropy could lessen considerably by mid-century, for several population related reasons. First, according to the low variant model, global population will reach its apogee at 7.7 billion people, by 2040. Thereafter, population levels will decline for good, according to this reasoning. Of course, population growth has declined greatly in most MDC's, so about 90% of the increase in world population will be in the LDC's. Most of these societies can ill afford increases in population, but if population-related challenges can be overcome, the LDC's should also see a drop in population growth before mid-century.[30]

Another crucial trend is the greater regional and global-scale cooperation on population and environmental issues. This is manifest from the greater success achieved at the United Nations Conference on Environment and Development (UNCED) in 1992, in which population issues played a key role. Likewise, the International Conference on Population and Development (ICPD) in Cairo in September 1994, agreed on a Programme of Action which, like UNCED, recognized the inseparability of population, environmental issues and sustainable development, and placed a particular emphasis on the rights of women in matters of reproduction, compared to the previous conferences in Bucharest in 1974, and Mexico City in 1984. Thus, these important international gatherings provide a foundation on which future efforts to tackle population-related issues can build. In the twenty-first century, the ability of states, IGO's and NGO's to work in concert to alleviate short-term entropy will yield the fruits of longer-term sustainability and a more peaceful global order.

A third factor in promoting longer-term stability is a future narrowing of the base of the population pyramids in most LDC's, due to the aging trends now so evident in Western Europe, North America and Japan. By 2050, the median age of the global population will be over 42 years, a great increase from the 25-year median age in 1995. Moreover, the percentage of world population 65 and above was about 6.5% in 1995. By 2050, this figure will be more than 18%.[31] As for the LDC's, the median age will almost double from 23 years to 41 years, a greater degree of aging than the grayest societies today. Thus, by 2050, the LDC's will deal with the problems associated with high dependency ratios, but due to a large concentration of people in the senior cohorts, rather than a huge burden of children with which they now struggle. Moreover, they will face these issues of aging with far fewer resources than the MDC's. These trends will likely mean decreased levels of migration, thus easing pressures on the developed societies to absorb greater numbers of immigrants. But the aging of the global population will test the ability of all societies to cope with large numbers of seniors, people who presumably will want to contribute to their societies and be assured of the same dignity and full humanity expected by those who are young. A grayer world should be less turbulent, but will still present challenges that will test human ingenuity in economics, health and public policy.[32]

Thus, a greater level of global cooperation at all scales, a demographic decline in the nest century, and a more sustainable civilization could yield a better future for humanity. However, much will depend on the nature of the global economic system, the next topic of concern.

30 Eberstadt, 19-22.
31 Eberstadt, 11-12.
32 Eberstadt, 18-22.

The Global Economy and Population

The contemporary global economic system is the product of a set of processes initiated in the sixteenth century with the commencement of European expansion. To gain a more holistic perspective on the problems associated with population growth and future trends, it is necessary to assess the impact of the evolution of the global economy on the current world spatial distribution of wealth and poverty.

From the late fifteenth century, a wave of European dynamism and power swept over the globe. This movement began with Portuguese and Spanish efforts to outflank the Islamic hold on trade with India and China, and the subsequent expansion of these two Iberian powers into the tropical regions. The use of slavery as a way to acquire cheap labor and develop colonies, and the search for gold and other mineral wealth, gave birth to the European mercantilist system. These two powers, soon joined by the Dutch, French and British, laid the foundations for a world economy of colonial commerce, built on superior military technology, corporate organization (e.g. Dutch, French and British East India Companies), and political ruthlessness. The spatial patterns and flows of wealth out of Asia, Africa, Middle and South America and the Caribbean imposed a pattern of dependency and poverty over most peoples in the non-European world.[33]

The Industrial Revolution, which began in Britain in the late eighteenth century, enabled the European states to widen the technological and military gap between themselves and the colonial peoples. European colonial powers strengthened their hold in areas already under their control, and expanded farther into the interior of Asia and Africa during the nineteenth century. In the first half of the twentieth century, railroads, steamships, autos and aircraft all accelerated the process by which wealth flowed from the colonized regions to Europe. The linkage of global financial markets was made possible by trans-oceanic telegraph cables, and the telephone. A truly global-scale economic structure was in the making. However, the closed economic colonial systems had to be transformed to complete the globalization process. The empires of the European states and Japan were fatally weakened in the First and Second World Wars. Consequently, two emerging giants, the USA and the USSR established a bipolar order over much of Eurasia in 1945. This development and subsequent Cold War put intra-European and world tensions into an ideological deep-freeze.

Unfortunately, the Cold War also obscured the deepening of the North-South dichotomy. In the capitalist First World, the creation of international economic coordinating agencies at the Bretton Woods conference in 1944 hastened the creation of the more highly articulated global economy. The International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (World Bank) have played a key role in financial regulation and development policy ever since. Moreover, Bretton Woods also established the General Agreement on Tariffs and Trade (GATT), which successfully reduced barriers to expanded world trade. Yet, despite these laudable efforts, and the decolonization of the Third World in the post-1945 period, patterns of wealth distribution established during the colonial period were maintained and expanded by a system of dependency. In what some scholars termed "neo-colonialism," former colonies in Asia, Africa and Latin America were designated the role of resource-providing, geoeconomic peripheries for the mass consuming cores in the North.[34]

33 Knox and Agnew, 389-398.
34 Knox and Agnew, 389-398.

In the context of the Cold War, the regions of the South were geostrategic prizes to be valued only for their natural resources or as sites for military bases to secure access to richer areas, sea-lanes or chokepoints. Developing societies were merely "dominoes," ideological chess pieces to be manipulated at will by the superpowers. The use of proxy warfare combined with massive influxes of arms and advisers to areas of regional conflict, created entire sub-regions of death through battle and famine (e.g. Horn of Africa, Mozambique, and Indochina). These policies were implemented by both superpowers, and the effects continue to be felt today.[35]

With the end of the Cold War, the North-South division has surfaced as the key global-scale division of humanity, and it is now the main concern of those trying to create a more sustainable global system.

Population and Agriculture

The physical map of the world provides a sobering picture of the limitations facing humanity in its efforts to feed and sustain itself. A careful look at the map reveals a land surface that is dominated by physical regions inhospitable to human habitation, either too cold, dry, wet, rugged or a combination of these limiting factors. These areas represent nearly 90% of the earth's land surface; land that cannot be used for intensive, sustained and profitable food production. Likewise, a global population density map displays patterns that reflect the suitability of specific climates, soils and topography for agriculture. Humans seek plains close to the sea. About 67% of the human population lives within 500 kilometers of the ocean, and 80% lives below 500 meters of altitude. Overall, 90% of the world's people lives on 10% of the earth's land area.[36]

Given these facts, it is not surprising that population pressures have been associated with global hunger, as well as increasing stress on societies which are not facing outright starvation. It is important to bear in mind that a large percentage of the world's grain is produced by relatively few countries, notably the USA, Canada, Australia, Argentina and the EU. China and Russia are also great producers, but they consume what they produce, and still must import to meet their needs. These surplus countries often use food as a weapon of political power and influence. Moreover, if China is removed from calculations for grain production, then the LDC's fail to produce enough grain to keep pace with population growth. This reinforces the patterns of dependence noted earlier. Since 1984, grain production per capita has decreased, most notably in sub-Saharan Africa, the hungriest of all regions. Finally, the patterns of land ownership and commercial plantation agriculture aggravate poverty and hunger in some regions, such as West Africa and Central America.[37]

The core-periphery perspective provides us with a paradigm to understand global hunger. Current patterns of global agriculture, in terms of land use and type of food production, reflect human adaptation to local and regional conditions of rainfall and soils, and land ownership. In the LDC's, these patterns were greatly influenced by the colonial experience. In the late nineteenth century, during the latter stage of European expansion into Africa and Asia, large tracts of the best agricultural lands were expropriated for commercial plantation agriculture for the purpose of supplying the colonial

35 Wayne C. McWilliams and Harry Piotrowski. *The World Since 1945: A History of International Relations* (Boulder Colorado: Lynne Rienner Publishers, 1993), 1-3; 163-165.

36 Peters and Larkin, 53; 250-251.

37 Peters and Larkin, 250-252.

core with coffee, tea, sugar and other products. The desire to acquire land in colonial areas for profitable commercial agriculture led to the forcible alienation of colonial peoples from desirable lands, as was the case with the Kikuyu in the Kenyan highlands.[38]

Today, the agricultural land use in the LDC's is characterized by various regimes of subsistence agriculture (i.e. intensive and extensive, tropical and dry), as well as commercial agriculture. In some regions, high yield varieties of grain, such as wheat in the Punjab, and rice in Java, have allowed dense populations to feed themselves, and even export surpluses. The Green Revolution, which began in the mid-1960s, resulted in the development of high yield varieties, due to genetic research and discoveries. The crops mature more rapidly than previous strains, thus allowing for multiple cropping. More than any other single factor, the Green Revolution enabled global scale food production to keep pace with population growth. But these gains were spatially concentrated within a few LDC's, and within these few countries, the benefits of increased fertilizer use, high-yield seeds, irrigation equipment and mechanization went to the better-off farmers, not to the rural poor. In the poorest region, sub-Saharan Africa, only 1% of the peasantry used high-yield seeds, while 22% used them in Latin America, and 36% in Asia.[39]

While the Green Revolution has allowed most regions to prevent large-scale famine by increasing yields per hectare, efforts to expand the area of arable lands face great difficulty. The UN Food and Agriculture Organization (FAO) estimated in 1987 that humanity had to increase cultivated land by more than 10% over the contemporary figure to achieve a balance between food and population. Although some societies (e.g. Brazil) are increasing land under cultivation, they are doing so at the expense of rainforests and other ecologically sensitive areas. There is doubt that such marginal lands can tolerate sustained agricultural use. In addition, those countries which rely heavily on irrigation (e.g. China and India) as a tool for increasing yields in arid regions face the prospect of falling water tables and what the FAO has termed the three "silent enemies," alkalization, salinization and waterlogging. These features of soil degradation are decreasing the amount of arable lands in sensitive areas.[40] Finally, societies that were densely populated before rapid industrialization, such as Japan, Taiwan and South Korea inevitably lose large amounts of arable land to the construction of roads, factories, warehouses, housing and other infrastructure. The processes of industrialization and hyper-urbanization, so much in evidence today in China, could result in that country losing as much as half of its arable land. If this occurs, China will be compelled to import massive amounts of grain, thus driving up prices in the world market above and beyond what the poorest of the LDC's can pay for desperately needed food. This issue is of great concern to regional specialists of Africa South of the Sahara, as well as China.[41]

Thus, global agriculture faces great challenges in feeding a world population that will continue to expand until at least the middle of the twenty-first century. The increasing strains on local and regional societies and ecosystems will result in continued crises in the most vulnerable areas, and a consequent increase in entropy levels in the global system. Nevertheless, the United Nations, other IGO's, and NGO's continue to develop strategies designed to alleviate famine and malnutrition, by increasing per capita food production through sustainable agricultural methods. These strategies are the linchpins in a noble effort to greatly reduce human misery in the years to come.

38 Knox and Agnew, 270-274.
39 Knox and Agnew, 316-317; Peters and Larkin, 260-261.
40 Peters and Larkin, 253-256.
41 Lester Brown, *Who Will Feed China?*, (Washington D.C.: Worldwatch Institute Publications, 1994).

The Demographic Future, Industry and Policy

The aging of the populations in the MDC's and the spatial flows of capital, factories and investments, all have a profound effect on the present and future of manufacturing location, economic policy and social planning.

MDC's have experienced a fundamental change in economic structure during this century. Viewed through the perspective of the Kondratieff long waves, developed economies were characterized by Fordism, a rigid structure of industrial organization and management, in which factories were located in MDC's near necessary sources of raw material inputs. These Fordist economies were basically national in character, particularly in the United States, and reached their zenith in the 1950s. However, this system began to decline in the late 1960s, as transnational corporations (TNC's) began to reorient themselves toward a more global approach to manufacturing and marketing. As TNC's gained greater profits and influence in political systems, the ability of the State to regulate and oversee these economic behemoths weakened, to the detriment of organized labor and environmental protection. The next Kondratieff wave has seen the emergence of a more chaotic, decentralized global economy through a process known as "flexible accumulation." Under this system, global finance has become a key regulator of governments, punishing those who depart from the free market orthodoxy that forms the ideological framework for global financiers and speculators. The State has found itself in an increasingly difficult position in attempting to regulate financial markets, which are often unstable and sensitive to political shocks. Likewise, multi-industry TNC's enjoy greater power, taking full advantage of the new international division of labor (NIDL) by moving manufacturing operations to Southeast Asian societies where labor is skilled, but much less expensive than comparable labor in the MDC's. Attempts to organize labor for better working conditions and pay are often crushed by authoritarian regimes in such countries as Malaysia and Indonesia.

Finally, the public policy implications of aging populations in a TNC-dominated economy of flexible accumulation are quite troubling. The rapidly graying populations of the EU and Japan must be cared for by a smaller percentage of the overall population (i.e. those who remain active, employed workers). Governments appear to have three alternatives, none of them politically appealing. They can raise taxes on the shrinking percentage of working people, reduce benefits, or restrict eligibility. John Maynard Keynes, the great British economist, wrote during the 1930s that a drop in fertility translates economically into decline because of stagnating demand and consumption. Keynes believed a healthy, expanding economy depended on a strong level of demand. If Keynes and his modern day followers are correct, countries such as Italy and Japan will experience stagnation and decline. The question of how to maintain economic prosperity and geopolitical power with an aging population is perhaps the most difficult dilemma facing the MDC's today. By the middle of the century, all societies on earth will have to deal with this issue.

Conclusion

In the twenty-first century, the continuing crises of population, ecological stress and the North-South division will continue to be the gravest challenges for humanity. The comprehensive nature of these geopolinomic challenges demands a global perspective and multi-disciplinary approach from scholars. Based on the analyses presented in this study, and the trajectory of current geopolinomic trends, the following outcomes are likely:

To 2010:

- An increase in entropy and system instability due to continued population pressures and associated effects of chronic underdevelopment, especially famine, intra-state warfare, conflict over fresh water (e.g. Sahel, Israel-Palestine).
- Greater North-South tensions due to the struggle of the LDC's for a greater voice in global affairs, particularly in IGO's such as the UN; also migration of laborers and refugees from South to North.
- Greater tensions between rapidly industrializing LDC's (esp. China and India) and MDC's concerned about the global commons; upheaval due to possible breakup of large states with restless, geographically concentrated minorities (e.g. China and India).
- Greater "South-South" cooperation, as LDC's seek to augment their voice by uniting on certain issues (e.g. international development).

Thus, the short-term prospects appear to be bleak, due in no small part to population growth and the subsequent effects on the global political-economy and the biosphere.

To 2050:

- A halt to global population growth, accompanied by the aging of populations in the LDC's; this should greatly decrease the burden of South-North migration.
- Increasing systemic stability, as dialogue between MDC's and LDC's improves; continuing environmental crises (e.g. deforestation, soil erosion, global warming) will compel greater cooperation on the global stage to protect the biosphere.
- Gradual creation of a more sustainable global economy (i.e. use of renewable energy resources such as solar, wind and hydro power; reuse/recycle economics).

Thus, by mid-century, the earth's population will likely begin a long decline. Combined with the invention and deployment of environmentally sound technologies in the public and private sectors, this bodes well for the relationship of the human species with the biosphere. However, such optimism is dependent upon humanity taking the necessary measures to avoid the ecocide that could result from our current, unsustainable global system. The question of how to transform our way of life toward sustainability is the core issue facing the human family in the twenty-first century.