Human Population Prospects: Implications for Environmental Security

by Robert Engelman

The emergence since World War II of authoritative demographic projections has brought to discussions of human population prospects an unwarranted sense of complacency. Because the projections are generally accepted as expert and reliable, non-demographic analysts tend to see projected population growth as an inevitable and unstoppable force in human affairs. A common but erroneous statement is that population is expected to double or even will double in size in the next century or so.

It is my intention to discuss population prospects while challenging public perceptions of population projections. These projections are valuable tools for considering the human prospect. They are, however, misunderstood as reliable guides to the future of human numbers, and this misunderstanding has potentially hazardous consequences. In particular, the apparent mathematical precision of projections encourages the misconception that there is nothing anyone can *do* about population growth, when there is very much we can and should do. The usefulness of projections could be enhanced by much more open discussion of the assumptions that underlie them, and an occasional challenge of some of those assumptions.

The challenge presented here is based on several principles. One, prediction of human behavior is necessarily subjective. The projection process is only objective insofar as it is made manageable by a handful of consistent assumptions, all of which depend on subjective judgment about future trends in fertility, mortality and migration, the three key variables of demographic analysis.

Two, consideration of population prospects ideally should be an interdisciplinary endeavor that takes into account the many factors—economic, social and environmental—that influence demographic variables. Debate on the earth's human carrying capacity has a history going back to the time of Thomas Malthus (Malthus 1798), and the exercise continues to this day (Food and Agriculture Organization 1984; Heilig 1993; Smil 1994). There have been few efforts, however, to make assumptions about demographic feedback loops, through which population growth itself could contribute to declines in fertility or increases in mortality (Lutz 1993).

Finally, in dealing with the future it is more useful to consider that which *could* be, rather than that which *will* be. The first category is so much larger in scope, so much closer to the grasp of current insight, and instills so much more hope for the future our children will inherit that it is puzzling why the second category occupies the stature it does. We have it in our power to significantly influence our demographic future. What follows will concern above all the population prospects we could claim for our species if we chose to do so.

Past and Present Realities

We know with reasonable certainty that the human species has expanded in numbers from at most a few tens of millions of individuals in prehistory to more than 5.8 billion at the close of the 20th century (for this and the following demographic data, see United Nations Population Division, forthcoming in 1997). Most of this growth has occurred since World War II, in large part because of global triumphs over infant and child mortality. Today, three out of every five people live in Asia, and more than one in three of these is Chinese. Each of the other major world regions is home to several hundred million people, but the populations of each continent are growing at different paces: Europe, with 729 million people, is growing very slowly at just under one-tenth of 1 percent annually; North America (mostly the United States and Canada), with 300 million people, is growing

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more rapidly at just under 1.1 percent annually; Asia, with 3.5 billion people, is growing at an annual rate of just under 1.5 percent; and the Latin American and Caribbean region, with about 485 million, is growing more rapidly still, at about 1.6 percent annually. Standing apart from the rest of the world demographically is Africa, with 738 million, where population growth has continued for decades at more than 2.7 percent a year, with only recent signs of falling. The average of all these uneven rates of growth worldwide is equivalent to that of Asia, or under 1.5 percent.

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Despite the ever higher population numbers, demographic growth is slowing. The annual growth rate peaked at 2.1 percent in the late 1960s and has drifted down since. When a growth *rate* slows, however, *growth* itself continues until the rate reaches zero. As the size of world population increases, more modest rates of growth can add larger annual increments to the population base. While the highest rates of population growth saw only about 72 million people added to world population each year, the current lower rates of growth are adding about 80 million people. This increment appears now to be declining. In a world without surprises, the projections inform us, the added numbers will gradually become smaller each year, until eventually (around 2200 by the UN's most recent medium variant) global births will equal deaths and world population will stop growing.

Most of the easing of world population growth rates occurred in the 1970s, a response in part to the spread of organized family planning efforts in developing countries during that time period. Fertility was also declining rapidly in industrialized countries. Often it fell for the first time in human history below the approximately two-child-per-couple average that is necessary (absent immigration) to replace each generation with the one that follows. The significance of this for the future of population is potentially enormous. Currently, throughout the developing world, women are seeking to have smaller families than their mothers and even their older sisters had, and they increasingly have the means to achieve the family size they seek. In industrialized countries, where effective contraception and safe abortion are generally accessible, women can have the childbirths they want, and total fertility remains below replacement level of slightly more than two children per women.

The other variable that shapes world population is mortality. (International migration affects the growth rates and size of national populations, but it has only an indirect and dimly understood impact on world population. Within nations, the dominant migration trend is urbanization, which for a number of reasons tends to reduce fertility rates.) Death rates, expressed as the number of deaths per thousand people in any given year, continue to fall in most places around the world. The dominant influences here are at both ends of the age spectrum: relatively fewer children are dying in the first few years of life, and higher proportions of adults are surviving to old age. Demographers assume that mortality decline will continue, placing some further upward pressure on the pace of population growth. The pace of mortality decrease, however, could moderate worldwide as further improvements in health care and nutrition become more difficult to achieve. In eastern Europe mortality rates have actually risen in recent years, and in sub-Saharan Africa, the AIDS pandemic is reversing past progress on mortality rates. Both trends, along with the growing specter of emerging infectious diseases, raise questions about the inevitability of mortality decline. A serious weakness of population projections is the assumption of continued mortality decline well into the 21st century despite this uncertainty.

Projections and Their Perils

The challenge for demographers is to understand the complex and uneven trends in fertility and mortality (and, to a lesser degree, migration) and to consider to what extent they are likely to continue into the near future. The major population projections are published by the United Nations Population Division and, until recently, by the World Bank. (The U.S. Census Bureau, the International Institute of Applied Systems Analysis and the Population Reference Bureau also offer world population projections, but these have less currency internationally.) The United Nations offers a medium population trajectory that, according to just-released 1996 numbers, would produce a global population of about 9.4 billion people around the middle of the 21st century, compared to 2.5 billion in 1950 and 5.7 billion in 1995. World population would then grow fairly slowly, leveling off at around 10.7 billion just after the 22nd century. The single projection offered by the World Bank resembled the UN's medium projection (United Nations Population Division 1992; World Bank 1993). The UN demographers, though not those at the World Bank, issue two alternative projections, low and high, at least suggesting that different population trajectories are possible. Long-range global projections released in 1992 and extending to 2150 included a total of seven projections. These projections suggest a world population reaching anywhere from 4.5 billion to 28 billion in 2150 (UN 1992). The newly-released

country-by-country projections suggest a 2050 world population between 7.7 billion and 11.2 billion.

In practice, however, most journalists and analysts take the UN's medium variant, or middle trajectory to be the most probable one, and it is often expressed as the expected or most likely population future. These terms are inaccurate, as projections are at best highly conditional predictions. The assumptions that prop up the medium projection in reality simply split the difference between more extreme assumptions. These assumptions themselves are at best educated guesses about how demographic determinants will play out, especially when looking beyond the immediate future. True, recent demographic history has unfolded as predicted by the UN and World Bank's medium projections. Nonetheless, there have been surprises. Prior to the 1950s, demographers missed the acceleration of rising life expectancy and falling death rates, so they underestimated population growth. Recently, demographers underestimated the acceleration of falling fertility, and the newest UN estimates and projections reveal a world population that is growing more slowly than they had thought.

Strictly speaking, no population growth, not even tomorrow's, is really *certain.* Until very recently, nuclear holocaust lurked as an ominous possibility. Today, astronomers blithely inform us that comets and asteroids could collide with Earth in our lifetimes. Obviously, in such catastrophic events, all demographic bets are off. In a world where not only comet collisions but emerging microbial epidemics—not to mention revolutions in childbearing practices—cannot be ruled out, words like *inevitable* and *certain* overstate the case. More importantly, such language lends itself to the false impression that no actions in the present can influence the near demographic future.

Dubious Assumptions

The debate on environmental constraints to population growth has been long, prolific and occasionally even bitter and *ad hominem.* Only a few points merit mention here.

When potential or supposed environmental threats are disaggregated and examined in isolation they can often be made to appear individually manageable. This is especially the case when humanity's historic capacity to innovate and adapt is taken into account. This approach is often taken by economists skeptical about the hazards of global environmental change, such as William D. Nordhaus of Yale University and Julian Simon of the University of Maryland.

Each assumption about a specific adaptation, however, presupposes that a specific environmental development occurs in isolation. Environmental trends, however, tend to occur simultaneously and synergistically. They may reinforce each other all the more if critical natural thresholds of sustainability are crossed. If, as ecological economists such as Herman Daly argue, economies are subsets of and dependent on ecosystems (Daly & Cobb 1994), and if individual happiness and morale are influenced by the conditions of daily life (the weather, access to clean water and sanitation, the price and quality of food, for example), then the state of the environment can affect social and political stability as well. And the impact of the whole of environmental trends on human life and death can be far greater than the sum of individual parts.

Environmental trends could influence birth rates as well as death rates, through increases in involuntary infertility and intentional decreases in childbearing. Logic and anecdotal evidence suggest that such fertility feedbacks could reduce birthrates. Infertility appears to be a rising problem from sub-Saharan Africa to the United States, although its epidemiology remains uncertain. Male animals exposed to certain chemicals resembling the hormone estrogen appear to develop female attributes. Rising exposure of women farmers to agricultural chemicals could be influencing reproduction, lactation and maternal and child health.

Equally plausible, declining environmental quality and rising scarcity of critical natural resources could be influencing the childbearing decisions of couples and women. The apparent positive correlation between economic development and declining fertility may be more complex and varied than once thought. Recent evidence indicates that increases in the status of women and wider access to family planning services are far more important to fertility decline than national economic growth (Robey, Rutstein & Morris 1993). Indeed, scarce housing and stagnant incomes may contribute to recent fertility declines in countries as varied as those of Italy and Kenya. Environmental factors could play a similar role in the fertility calculus. Carl Haub, a demographer for the Population Reference Bureau in the United States, recently found in a survey of women in Belarus that lingering effects of the nearby 1986 nuclear accident at Chernobyl were discouraging many women from having additional children. And a recent World Bank study of the population-environment nexus in sub-Saharan Africa found that desired family size in the region tended to fall as arable land became less available (Cleaver & Schreiber 1994.). In a world of resource scarcity, declines or stagnation in economic well-being may actually encourage declines in fertility where couples and women have some control over childbearing.

More positively, it is the combination of access to quality family planning services, a chance to complete at least most of secondary school, and enhanced opportunities for women in the formal economic sector, to own farms or launch businesses for example, that powerfully delays childbearing and reduces fertility among women in developing countries. Add the steady

march of urbanization, and fertility decline could occur more rapidly than demographers have assumed. Lacking any way to assess the probability of such synergistic impacts on fertility trends, demographers tend not to factor them into projections—a fact that can be misread as a prediction that such changes will not occur.

One mathematical quirk about projected fertility decline further weakens projections but receives little attention. This involves total fertility rate, or TFR, the number of lifetime childbirths a woman would have if she experienced rates typical of each age group in her country at that time. World population projections assume that each country will eventually reach a TFR slightly above, slightly below or precisely at two children per woman and will then settle precisely at the selected figure indefinitely.

This assumption has its roots in history and mathematical logic. For most of human history, the effective number of children who survive to become parents themselves cannot have been many more than two per women, or else population would not have grown so slowly for most of human history. Incredible as it seems today, families in which only two children survived to maturity must have been the average even in Africa and India, which had relatively stable populations for hundreds of generations before colonization by Europeans.

It is possible that traditional modes of contraception, especially prolonged breastfeeding and postpartum abstinence, resulted in significantly lower birthrates. The dominant influence on what is called the net reproduction rate, however, was the much higher death rates of the past. An African woman of the eighth century, for example, may on average have given birth to six live babies. But the chances of any one of them surviving to become a parent were only about one in three, and life expectancy probably hovered in the late teens and early twenties. Seen this way, population programs in developing countries do not so much impose upon their citizens the alien modern influence of artificial contraception; rather, they weaken the alien modern influence of persistent above-replacement fertility, brought about as an unintended byproduct of lower death rates (Cleland 1993).

Even more important for demographic projection is the mathematical logic that dictates that something very close to replacement fertility must be achieved again in the near future. Exponential growth cannot continue indefinitely on a finite planet. In 1974 Ansley Coale calculated that at then-current rates of growth human population would occupy every square foot of land on earth within seven centuries, and within 6,000 years the mass of humanity would form a sphere expanding at the speed of light (Coale 1974). Faced with the impossibility of extended exponential growth, demographers assume that current population growth levels are a historical aberration, and that humanity will return to historical near-replacement fertility levels within a few generations. The dramatic fertility declines of recent decades further justify this assumption.

There is no guarantee, however, that replacement fertility itself will always be two children per couple. If infant and child mortality rates began to rise from their current historic lows, replacement fertility itself would rise. Already today, the replacement fertility rate in high-mortality countries such as Ethiopia is as high as three children per couple. In the deep past, when the life expectancy of women was as low as 20 years, replacement fertility could have been as high as 6.5 children per woman. Obviously, no one would want to envision a future as grimly fatal as this past, however, so the conventional assumption is that replacement TFR is always just a bit higher than two children per woman.

Practically speaking, the developers of projections make their best guess as to when total fertility rates will reach something close to the replacement level of just over two and then, lacking any more probable scenario, the demographers assume fertility will lock in at this level. The United Nations most recent long-range low, medium and high variant projections are based on the assumption that total fertility rates stabilize, sometime before 2100, at about 2.05 (medium projection), 2.5 (high projection) or 1.7 (low projection).

Intriguingly, the oft-cited medium projection assumes that couples and women in industrialized countries will also settle at a TFR of slightly more than two children each, even if women in these countries today have *fewer* than two children each on average. In many European countries and even such developing states as Hong Kong, Singapore and South Korea, fertility rates sit at levels that will lead (or have already led) to population decline. The medium projection assumes that women in these countries will eventually, in effect, come to their senses and begin having the number of children needed to prevent depopulation of their national territories.

How realistic, however, is the assumption that any society will reach replacement fertility, either from above it or below it, and then remain there? Is there something magical about this figure of 2.05 children per woman? The reality is that replacement fertility is more a demographic concept than a force of reproductive gravity for women and men. Many industrialized countries that have experienced replacement fertility have then moved on, without noticeable disruption, to reduce their fertility even further or to return to higher levels of fertility. In Argentina and Costa Rica, to pick two examples, overall access to family planning services and schooling for girls have improved greatly, yet fertility has remained above replacement levels. In few if any countries has the total fertility rate stabilized at any low level, let alone two children per woman, for

a long period. Yet this is what the projections assume fertility will do.

The demographic experience of the world to date suggests that total fertility rates are dynamic and highly responsive to the circumstances of women and couples. Although there are good reasons to expect fertility decline to continue where families are typically large, there is no particular reason to assume fertility rates will settle at 2.05 or 2.5 or 1.7 children per woman. Nor does it make sense to assume that below-replacement fertility will inevitably lead to population decline (since the rates may well rise if housing or other economic conditions improve), or that below-replacement fertility return to and stabilize at replacement fertility. The implications of dynamic and condition-specific fertility rates for the future of population growth could be substantial.

What other factors might cast doubt on the population projections? One of the most important is the timing of childbirth. The projections assume no changes in the ages at which women and girls first give birth to a child. Nor do the projections assume that mothers will wait longer between pregnancies before giving birth to subsequent children. It is the nature of calculating TFR, which is based on the number of children born to each five-year cohort of women of similar ages, that age at first childbirth and birth spacing are only indirect issues. (The approach section of the United Nations Population Division's 1992 long-term projections, for example, states that the only difference among the various projections in fertility is the average lifetime births per woman, with no consideration of the timing of those births [UN 1992].)

Yet the timing of childbirths influences birth and population growth rates with impressive force. If women wait longer before their first childbirth, and longer between each subsequent one, they contribute to an attenuation of generations that reduces birthrates and slows population growth. They do this even if they have just as many children as they would have had with no birth delay or spacing. (In practice, women who begin childbearing late and practice child spacing tend to have fewer children.) Moreover, the demographic impact of these practices is immediate. Delayed births weaken population momentum, the force that propels near-term population growth even in the face of replacement fertility because tomorrow's parents are already here today.

Yes, tomorrow's parents are here today. But if they not only have few children but have them late and through widely spaced births, the effects on near-term population growth are surprisingly large. John Bongaarts, a demographer with the Population Council, has calculated that if the mean age of childbearing in developing countries were to rise gradually by five years between today and 2020, and if global fertility rates immediately reached replacement, the population of these countries would stabilize by 2100 at a level 1.2 billion people fewer than would be the case if replacement fertility began immediately in the absence of any change in childbearing age (Bongaarts 1994). Such numerical differences could make a major difference in population projections if low and high assumptions about the average age of childbearing were taken into account.

Effecting delays in childbirths and longer intervals between pregnancies would be most likely to result not from intrusive population-control measures but from better educational opportunities and more access to paid employment. Also important would be help in improving sexual negotiating skills among adolescent girls and crucial access to a wide range of birth-spacing contraceptives. Perhaps most important of all, the evidence is overwhelming that more women and children survive pregnancy and the first few years of life when the mother is no longer a teenager and when births are spaced at least two years apart. Policymakers could actually slow population growth by focusing their attention on maternal and child survival simply because the level of contraceptive prevalence needed to assure high survival rates would lead, as a side benefit, to substantial declines in births.

Prospects and Possibilities

Demographers point to three near-certainties in the future of human population growth: Considerable growth will occur before population stabilizes or reaches a peak; the vast majority of this growth will continue to occur in developing countries; and as population growth continues to slow down, national populations even in developing countries will age dramatically.

Beyond this, we are left with the precisely quantified projections of the United Nations and a few organizations. It is much less clear that these are reliable guides to the prospects for world population. The projections point out where human population is *headed*, but not necessarily where it will *go*. If current trends continue, and fertility falls toward replacement levels while life expectancy rises to the optimum, then the range of expectations for the future of human population is probably about what the projections describe. Certainly it will be very difficult to stabilize population at a level below 7.7 billion people without either rising mortality rates, which no moral society could willingly accept, or delays and reductions in childbearing beyond what seems likely today.

In peering into the future, it is useful to consider population projections—all the variants and scenarios, not just the medium ones—as a statistically sound basis for what would be most likely to happen in a future without significant surprises. Then we should constantly remind ourselves that demographers have con-

structed a series of artificial alternatives in which all change is gradual and limited. These alternatives can teach us about our options in the present, but the future is unlikely to unfold exactly as they describe. It is difficult to keep in equipoise this seeming contradiction exploiting plausible scenarios for research and education purposes while reminding ourselves and the public that no single scenario can be considered likely in all its details. This, however, is precisely what is needed.

What, then, are the prospects for world population? It is here that experience, values and subjective judgment combine for what must be a personal and individual view. Clearly, we must loosen the grip the medium projections have on the limited attention of policymakers and the public. We need at least to bring to greater attention the range of growth suggested by the low and high projections for the next century and beyond. And, despite its necessarily artificial quality, we should hold forward the low projection as a vision worth working toward. It is not a target but a hoped-for byproduct of aggressively pursued development initiatives that slow population growth while serving more immediate human needs.

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Demographers are not convincing in arguing that the low projection lies on the very borders of the impossible. In most instances in which the projections rest on unrealistic assumptions—especially optimal life expectancy for all, and continued young average ages of childbearing—logic and some evidence argue for adjustments that would result in lower rather than higher population growth. Birth rates could fall more quickly than the projections suggest. As we have seen, unexpected declines are emerging in sub-Saharan Africa and other regions. Death rates, unfortunately, may end up being higher than the projections suggest. Both of these factors could combine to produce an earlier-than-expected peak in population size.

It is possible, in fact, that population growth could decelerate for both commendable and deplorable reasons: a simultaneous mix of improved access to family planning and more decisionmaking power in the hands of women, combined with some increases in infertility and in death rates that no one could applaud. Indeed, approximately such a mix (with access to abortion substituting for the availability of good contraception) appears to be responsible for a reversal of population growth in the former Soviet states. The responsible position for advocates of population stabilization is to work to bring down child and maternal mortality while continuing to support universal availability of reproductive health and family planning services and the greater capacity of women to use them effectively.

Humanity today is now crossing a series of significant environmental thresholds at a time when even democratic societies seem disinclined to take such threats seriously and to help those whose well-being is most threatened. These threats include: early signs of human-induced climate change, a peaking of the global fish catch, the growing scarcity of renewable fresh water, massive degradation of agricultural soils, the global reemergence of infectious disease, and increasing resistance among microbes and pests of all kinds to drug and chemical attack. Human beings are an innovative species. But in today's free-market economies, innovation follows not so much human need as profitable opportunities. Will it be profitable to extend and improve the lives of the poor? And, if not, will governments or other benefactors pay for the innovations that will be needed to accomplish that goal?

Because the planet and its resources are finite, world population must eventually reach a peak. Therefore global total fertility rates must eventually reach replacement levels. These logical statements do not make it certain that women on average will have just two children at any particular point in the future. Falling life expectancy could perversely raise replacement levels above two children per woman. Even on the optimistic assumption that replacement fertility levels will not increase, however, a two-child average family hardly seems implausible. This is especially the case when one recalls that a total fertility rate of two is compatible with the presence of three, four or more children in many families. Adoption, of course, is an obvious but under-emphasized option for those wanting large families. But all that is required demographically is that a significant proportion of people of reproductive age choose to have only one child or to remain childless. A replacement-fertility society would not have to impose a two-child norm.

Already more than two out of every five human beings lives in a country in which total fertility rates are at or below replacement levels. In rural areas, land, fresh water and fuelwood are increasingly scarce, encouraging new thinking about the benefits of small families. The rising necessity and growing costs to parents of education and the onward march of urbanization contribute to the same reexamination of the costs and benefits of large and unplanned families. This is

especially the case as more people are exposed to the global information network with its enticing visions of options and possibilities beyond raising a large family. Added to these social factors is the growing commitment of countries, with some notable exceptions, to develop and implement population policies and to base them on improved access to voluntary family planning and reproductive health services and better overall opportunities for women. The consensus reached at the 1994 International Conference on Population and Development (ICPD) in Cairo has not yet produced the needed shift of financial resources to population and human development efforts. But the conference succeeded in establishing an international standard for the work ahead. As governments search for guidance in dealing with demographic pressures, the ICPD's Programme of Action offers a set of strategies that could dramatically slow population growth while producing immediate improvements in the lives of women and men.

While the number of women of reproductive age grows by about 24 million each year (Population Action International 1996), an estimated 228 million women, one out of every six of reproductive age in the world, lack effective contraceptive protection (Alan Guttmacher Institute 1995). Nonetheless, there is reason for optimism. Historical experience suggests that, once launched, major movements for human rights rarely retreat. It seems likely that women will expand their influence in economic, political and social spheres. Their rights will be more widely respected in the next century than in this one.

The idea of planned pregnancy, too, moves inexorably forward. The past three decades have seen contraceptive prevalence grow from 10 percent to 55 percent of developing world couples. This suggests a world of satisfied clients, and a powerful and pervasive force that is likely to become more so in the complex and hazardous times that lie ahead.

The future of world population depends in large part on the willingness of nations to invest the financial resources needed—about $17 billion a year by the end of this decade, a relative pittance compared to military spending—to insure universally available reproductive health care. This would include access to family planning for those who seek it, combined with maternal and child health care and the preventive services aimed at sexually transmitted disease. If the resources were invested wisely, something roughly resembling the low projection of population growth could be achieved even with continuing declines in death rates. Two complicating factors deserve brief mention here: abortion, and China's population program. Changes in either could significantly effect world population growth. Although the demographic implications of abortion are rarely discussed, they are significant. While 190 million pregnancies occur each year, 51 million of these end in abortion—21 million in countries where the procedure is illegal. Since the world's population is growing by 80 million people each year, elimination of abortion without decline in unintended pregnancy would spur population growth by dramatically raising birth rates. On the other side, the proportion of births desired at the time they occur varies from an estimated 76 percent in sub-Saharan Africa to a mere 38 percent in Latin America (Alan Guttmacher Institute 1995). Wider access to safe and legal abortion around the world would undoubtedly reduce the many births that result from unintended pregnancy. Overshadowing the demographic implications, however, is the fact that access to safe abortion is critical to the health and survival of women, especially poor women. An estimated 500,000 women die each year from causes related to pregnancy and childbirth, and more than 100,000 of these deaths are the result of unsafe abortions. The safest bet is that the status of abortion will continue as today, with varied legality and accessibility, and thus will not trigger any demographic surprises.

The high visibility of China's population policy excesses raises difficult questions in the population field. Ultimately, population stabilization is more likely to occur—and endure—on the basis of voluntary childbearing decisions rather than from the kind of government mandates and pressures that characterize China's policies and programs. Population stabilization cannot be built upon the kind of short-term changes in fertility that coercive population-control programs may produce temporarily but cannot sustain. To help rapidly growing countries stabilize their populations, programs and policies will have to succeed not on time scales of political terms of office, but over generations. And to succeed at this they will have to be based upon popular consent and participation.

Population policies and programs can help serve the demographic goals of a society, but only by serving primarily the private and felt needs of couples and individuals. Realistically, the future is likely to see less rather than more population control—meaning direct government attempts to bring population size to a target range—just as it is seeing less rather than more economic and political control.

Should governments nonetheless aim for an optimum world or national population size? Some analysts have suggested that such a number could be identified and perhaps even arrived at, but there is good reason for skepticism. The world is too complex. The figure would vary substantially—even if we had the needed data and understanding, which we do not—depending on the environmental issue or natural resource chosen for examination. More importantly, there is no population policy imaginable that would respect human rights, and thus be worth supporting, and that would also take us precisely to this hypothetical demographic state of heavenly stasis. While popu-

lation dynamics do respond powerfully to governmental and private initiatives, the very idea of population *control* is fundamentally unworkable. As long as human freedom is paramount among our values, reproductive freedom should and will be highly valued. We can no more control population than we can control people themselves.

It makes more sense to work for better understanding among all people of the linkages between population and environmentally sustainable development. Policies can then tolerate and even encourage the lowest fertility levels consistent with the free and responsible decisions of women and men to have the number of children they desire. If such a goal is ever achieved, solutions to still-threatening environmental and other social problems will need to be sought exclusively among non-demographic contributing factors. We are, however, a long way from this point. For the foreseeable future, policies that improve the lives of women, especially those that allow them to make their own decisions about the timing of pregnancy, will contribute powerfully to a better world for all human beings.

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