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WORLD POPULATION: AN UNWISHFUL ASSESSMENT, A HOPEFUL PROPOSAL

William G. Hollingsworth*

Unfortunately, few political leaders appreciate the urgency of the population problem, because they are not aware of the enormous momentum built into current population growth rates. This momentum is particularly ominous in developing countries as a result of the tremendous increases in the numbers of people entering the childbearing years. For example, a developing country that has a 3 percent population growth rate and wishes to have its population level off at double its present numbers must reduce its average family size from over four children per family to slightly over two children per family in steady stages within the next ten years. If it waits twenty years before starting such a ten-year program to reduce family size, its population will grow to nearly four times its present numbers.

—Richard N. Gardner (emphasis his)**

“Hell is truth seen too late.”

—Thomas Hobbes

I. INTRODUCTION

Present world population of over 4.5 billion appears to be growing at an annual rate of about 1.8 percent.1 Should humankind continue to grow at this seemingly low rate, the number of human beings

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would double every thirty-nine years.2 This would mean—but, of course, does not assure—a human population of about nine billion by the year 2020.

To look only at worldwide figures, however, obscures the well-known reality that present population growth is concentrated in the world’s most economically distressed regions. Based on data from the late 1970’s, much of Asia is experiencing annual growth rates above 2 percent, which represents a population doubling time of less than thirty-five years.3 Latin America’s population is growing at 2.3 percent per year, a population doubling time of thirty years;4 Africa is growing at a 3 percent annual rate, a population doubling time of twenty-three years.5 If a nation’s population continues to grow at an annual rate of 3 percent—a growth rate that many nations today either approach, equal, or even exceed—the resulting population increase in a century will be nineteenfold.6 Even a one percent annual rate, well below the world’s 1.8 percent growth rate, would yield a 270 percent population increase in 100 years.7

Juxtaposed with the foregoing data is the doctrine—or the myth—of absolute national sovereignty. One by-product of the absolutizing of national sovereignty is the assumption that each nation is ethically free to decide against limiting its population growth. Indeed, a large and growing population historically has been viewed as a signpost of national success and an essential element of national power. Nonetheless, contemporary awareness of the massive tragedy invited by uncontrolled population growth mandates an immediate reevaluation of the view that each nation is free to grow without limits. In response to this sometimes feeble but increasing awareness, this article will consider the need for and prescribe a population limitation ethical imperative for the world’s nations. The article will attempt an ethical inquiry into and offer recommenda-

2. Id. One, of course, does not expect the world’s population growth rate to remain forever constant.
3. See id.
4. Id.
5. Id.
7. Id. Due to the combination of high birth rates and rural-to-urban migration, many Third World cities will experience growth in excess of 3% in the decades just ahead. Many will triple in size over the next twenty-five years. If present trends continue, the population of Cairo will exceed 15 million, and Sao Paulo will exceed 25 million, by the end of this century. Mexico City will have to accommodate—somehow—over 30 million persons. See Beir, Can Third World Cities Cope?, Population Bulletin, XXXI, No. 4, at 8-9 (Dec. 1976). In these and other already poverty-laden cities, the outlook for human dignity and freedom is grim.
tions as to the population goals of nations. The obviously vital but generally secondary questions of means, both international and intranational, must be dealt with elsewhere.

II. OBSTACLES TO AN UNDERSTANDING OF THE PROBLEM

A. Our Biases

Our predilections against "zero population growth" (ZPG) are of a primordial, instinctual nature. Despite the severe stresses already being caused by increasing population, the wish to discourage population growth still somehow seems inhospitable, ungenerous, unmag-nanimous, anti-humanitarian, and sinister. Likewise, the ethical problems involved in attempting to achieve worldwide ZPG are capable of tormenting any morally sensitive soul. Thus, for highly personal, highly emotional, and often morally important reasons, most if not all people most desperately would like to believe that the call for a serious global effort toward population stability is a false and neglectable imperative. After all, how many persons with any claim to social virtue want to risk sullying their own possibly fragile moral self-image or reputation? Accordingly, some polemicists have depicted ZPG, indeed have depicted the entire ecology movement, as the modern elitist equivalent of keeping the king's hunting preserves untrampered by the common folk. With equally tragic misguidance, others have condemned the idea of worldwide ZPG as neo-colonial-ism, neo-racism, even as racial genocide—a set of judgments in perfect conflict with the well-being and the survival of the very peoples the judgers are purporting to protect. Still others have played off the idea of striving for a stabilized world population against the idea of transforming the affluent nations' high-consumption, high-pollution economic behavior, as if humanity is apt to have the luxury of choosing only one of the two remedies.

By far the worthiest personal, emotional, and moral impetus against a social commitment to a nongrowth rate of human reproduction is simply the justifiably extremely high valuation that any caring person places upon every individual human being and upon the sacred vocation of parenthood. Yet, never has so authentic a pair of moral valuations sired so inauthentic and anti-humane an ideology of absolute laissez faire. Like all ideologies positing absolute in-

8. "Zero population growth" (ZPG) is an often used synonym for population stability, i.e., no numerical growth.
individualism, the doctrine that deciding how many children to have is a purely private matter ignores basic social facts. The reality is that in deciding to conceive fewer children than they biologically could—which describes the behavior of almost all couples in almost all societies—individual couples do indeed limit the creation of other infinitely valuable individuals. All such individual decisions are likely to be influenced socially to some nontrivial extent. Nonetheless, a socially explicit decision to discourage other people from having as many children as they otherwise might have wanted seems to offend virtually every liberal, libertarian, and Judiac-Christian value.

B. Our Fallacies

For the foregoing and other reasons, some sublime, some not so sublime, numerous thoughtful and not-so-thoughtful souls have succumbed to an epidemic of self-deceptive wishful thinking. Minds capable of far better thinking have accepted or espoused fallacious and unrealistic arguments to avoid confronting the admittedly soul rending moral imperative of global population limits.

Perhaps the most simplistic fallacy concerning population is to view the matter purely as a problem of physical space. Generally, the argument runs thusly: “If we ever run out of places to put people on the earth's land, we can always build floating cities on the sea or [currently more popular] orbit them around the earth and/or colonize the moon and other nearby celestial pieces of real estate.” Unfortunately, such “solutions” utterly fail to grasp the nature of the problem. The problem of population limits consists of the relationship between numbers of people and the supply of all the resources necessary to sustain persons in a state of at least minimal well-being. In this light, to say that we have or expect to have one, some, or even most of the necessary resources will not do. The lack of any one essential resource is the sufficient condition for massive tragedy.

Whatever the concern at issue, the wishful thinkers profess an absolute religious faith in the power of technology to supply every need or to solve every problem, at least in the long run. As to the food

9. See generally J. Simon, The Ultimate Resource (1981). In this work human ingenuity acquires the infinite creative power of a super deity: it has the potential to service however many people there ever are by creating all the appropriate resources needed forever (except during "temporary shortages"). See id. at 345-48. Although Simon’s book is replete with graphs and charts, his data fail utterly to support his leap of technological faith. An important reason for the failure is the fallacy of blindly assuming that a world ecosystem attempting to support anywhere from 7 to 9 billion people or more as well as all their industries will function
needs of increased billions, it has been confidently denied that the supply of land or of any other natural resource will constrain the world's food supply for "the foreseeable future." 10 Essentially, there are only two ways to increase food production. One is by increasing per-acre yield; the other is to increase the total acreage devoted to food production. The development of synthetic food materials and the exploitation of alternative resources such as ocean harvesting do not alter the primacy of these two approaches; rather they are incorporated in the two approaches.

With regard to the first approach, increasing the per-acre yield, Worldwatch Institute's Lester Brown has reported that food production increases in the last three decades have "entailed land abuse so severe that fully one-fifth and perhaps as much as one-third of the world's cropland is losing topsoil at a rate that is undermining its long-term productivity." 11 In addition, should anything like today's population growth rate continue much longer, achieving the required increases in per-acre yield is apt to necessitate massive increases in the use of chemical fertilizers and pesticides, a prospect that threatens the planet's biological processes. 12 These are not the only dangers. As University of California at Berkeley Professor John Holdren has warned, increasing food production to meet population demands could require the further curtailment of what little agricultural diversity exists. Such an agricultural system would plant only the very highest yield crop strains, thus sacrificing humanity's hedge against general crop failure from pests, disease, unforeseen weather conditions, and other naturally occurring problems. 13 Hence, the strategy to increase food production could itself cause massive famine. This remains so with or without the utilization of "synthetic food factories."

No matter what crops are planted, world agricultural production is subject to sudden and drastic reduction due to major global climatic

with the same efficiency and effectiveness as did a world ecosystem supporting 2 to 4 billion people and their industries. This is like saying to a blindfolded runner in canyon country, "Keep on going at full speed. You haven't fallen off a cliff yet." For other criticisms, see REVIEW SYMPOSIUM, POPULATION AND DEVELOPMENT REVIEW, VIII, No. 1, at 163-77 (Mar. 1982).

10. J. SIMON, supra note 9, at 68.
12. Concerning fertilizer, see Borgstrom, Never Before Has Humankind Had To Face the Problem of Feeding So Many People With So Little Food, SMITHSONIAN, VII, No. 4, at 71, 76 (July 1976).
13. See Holdren, Population and the American Predicament: The Case Against Complacency, DAEDALUS, CII, No. 4, at 31, 40 & n.18, 43 (Fall 1973).
changes, changes that have been the norm rather than the exception in human and pre-human history. As a result, continuing population growth at rates that will effectively preclude the achievement of a substantial agricultural margin of safety is a virtual guarantee of macrocosmic famine sooner or later.14

The only other way to increase food production—and we will certainly have to employ both ways—is to increase the total acreage devoted to agriculture. As Michigan State Professor Georg Borgstrom has noted, “The awareness of what it takes in land, water, and storage to feed each person has, by and large, been dissipated in the euphoria of alleged technical and economic miracles.”15 The enlarge-

14. It has been suggested that some margin of safety now exists in the considerable potential for redistributing the present level of agricultural production. Of principal importance, affluent nations could curtail the extremely wasteful use of plant protein involved in those nations’ excessive meat production and consumption. Thus, a significant portion of present livestock feed production acreage and grazing lands could be used to produce grains and other plant foods for direct human consumption worldwide. Although one can scarcely imagine a more difficult undertaking politically and administratively, such a redistribution ought to be attempted. Unfortunately, however, any plausibly imaginable degree of success is not apt to do more than reduce much existing undernutrition—hardly an insignificant feat. But even if present needs could be nearly or barely met with existing output, that victory would provide no margin of safety against a major setback in agricultural production. Much less would mere redistribution suffice with continuing increases in population.

15. Borgstrom, supra note 12, at 74. I haven’t forgotten the sea with its “three-dimensional” acreage. Nonetheless, Jacques Cousteau suspects there may have been a 30 percent decline in the intensity of marine life in the last 20 years. The likeliest causes are man’s overexploitation and pollution. Worldwatch Institute’s Lester Brown notes that, despite enormously increased and technologically sophisticated investment in fishing fleets and fish farming, the world’s fish catch has leveled off since 1970, with the annual fish supply per person falling by 13%. L. Brown, Resource Trends and Population Policy: A Time for Reassessment, Worldwatch Paper 29, at 8 (May 1979) [hereinafter cited as L. Brown, Resource Trends]. As for the highly uncertain potential from massive sea farming and the like, one must hope, pray, beg, and implore that man will tread extremely softly and assess with great care the possible consequences of any further major disruption of the world’s gravely jeopardized underwater biology and chemistry. There is nothing at stake except an indispensable link in the planet’s life chain and the primordial source of all earthly life.

[W]ater, as the universal solvent, is easier to pollute than soil; physical and chemical contamination of bodies of water have detrimental or lethal effects on aquatic organisms or their consumers and are much more difficult to prevent or control than is the case for expanses of land. Also, aquaculture organisms tend to concentrate pollutants. Pollution is often heaviest in some of the places where ocean-based aquaculture would thrive best. Aquaculture is limited to regions with enough water in the desired form (temperature, salinity, etc.) for a specific crop. Costs for large scale industrial production of aquaculture tend to make the product available only as high price luxury food; pumps, tanks, feed and labor costs are high. Fish disease is difficult to control because of the water medium and crowded conditions.

M. Gabel Ho-Ping: Food for Everyone, 161 (1979) (omitting his numerical listing format). Even so, “[a]quaculture has very high productivity in many situations.” Id.
ment of agricultural land acreage is already causing extremely serious problems. Writes Professor Borgstrom:

In the course of Man's quest for food more than half the world's forest cover has vanished, large areas of grassland have been plowed, and major groundwater reserves irreversibly drawn down. China and India . . . have both paid a very high ecological price for their millions. Forest and pasturelands have been squeezed down to wholly inadequate levels. Erosion, desertification, waterlogging and salination have destroyed much tilled land and are jeopardizing still more. Irrigation reservoirs are filling with silt at ten times the anticipated rate. 16

The needs of a surging world population will require that more and more land be cleared and otherwise altered for both agricultural and non-agricultural uses. In the words of Rene Dubos:

man will have to eliminate all forms of wildlife that would compete with him for space and for food; . . . he will tolerate wild landscapes only to the extent that they serve his needs . . . . Man will thus destroy all the aspects of the environment under which he evolved as a species and which have created his present biological being. 17

The costs and risks inherent in substantially increased environmental destruction are much more than a matter of elitist aesthetics. Concerning the costs, Erik Eckholm writes as follows:

Since the impending large-scale loss of species is without precedent and involves the disruption of ecological systems whose complexity is beyond human grasp, no means exist for quantifying the costs . . . . Some species of proven economic value are under acute pressure, but perhaps the greatest social costs of species destruction will stem from future opportunities unknowingly lost. [For example, o]nly a small fraction of the earth's plant species have been screened for medically useful ingredients. 18

Mihajlo Mesarovic and Eduard Pestel had earlier attempted to suggest the awesome risks, as they stated:

Today we understand much better than our ancestors that the existence of all life on Earth—our own included—depends on the stability of the ecological system. An Earth with less diverse inhabitants might not continue to possess the stability essential

for adaptation and survival. And if our ecosystem breaks down—even if only temporarily—the effect on mankind will be calamitous. The ultimate irony confronting technological man may well reside in the fact that Nature's most potent threats to human welfare are not her destructive power—earthquakes, tornadoes and hurricanes—but the fragility of the web of life, the delicacy of those skeins which bind species to species and which comprise the dynamic bonds which relate the animate and inanimate realms so inextricably in the process of life. ¹⁹

One should also understand that the demands of a growing world population go well beyond the individual's need for food and standing-sitting-sleeping space. We must reject in toto the following particularly fallacious argument. The argument asserts that there is no reason to be very concerned about high population growth rates in the so-called "Third World" because the peoples of those nations use so little energy and other resources and cause such little pollution. Surely one cannot accept ethically the unstated assumption of this argument: that hundreds of millions of present and future Asians, Africans, and Latin Americans can and should be expected to spend the rest of their lives on a bare subsistence diet crowded beside some barren hovel while ensuing generations of North Americans and Europeans in the so-called "first two worlds" continue to watch their television sets and go for Sunday drives. Here indeed is a neo-colonialist and genuinely racist approach to population policy. ²⁰

³. TOWARD A CARING REALISM: THE BASIC PROPOSAL

Both minimal justice and political reality require us to ask a very tough question. How, in fact, would humankind be able to produce and, where necessary, transport enough heat, shelter, clothing,

²⁰. Besides its ethical unacceptability, the approach is factually false even as to the problem of satisfying people's basic needs:
Villagers in the poor countries where firewood is used for cooking are decimating local forests. The average villager requires between one and two tons of firewood each year, and expanding village populations are raising firewood demands so fast that the regenerative capacities of many forests are being surpassed. . . . Under the population onslaught, forests recede farther and farther from the villages until entire regions and countries are eventually deforested.
Happily, Third World governments are becoming increasingly aware of the threat that continued substantial population growth poses to their nations' well-being. See, e.g., N.Y. Times, Nov. 2, 1981, § A, at 13, col. 1 ("Legislators from 19 Asian countries have concluded a United Nations-sponsored conference on population problems by proposing that their governments work to hold Asia's annual population growth rate to 1 percent by the end of the century").
water and sanitation systems, medicine, hospitals, fertilizer, farm machinery, farm produce, education, communication, and other goods and services to meet at least the basic needs and most minimal amenities of eight, ten, twelve, or fourteen billion people without wreaking massive life-destroying havoc on the planet's already beleaguered environment? Even the congenital hyperoptimist must admit that there is a substantial chance that, even with the most earnest effort plausibly imaginable, humanity would not be able to devise and carry out humanely a feasible answer in time.21 Professor Holdren warns of civilization's growing interference in the planet's "biological processes that provide us with services we do not know how to replace."22 His words deserve careful perusal, as he states:

The cycling of essential plant nutrients such as nitrogen, phosphorus, and sulfur is contingent at various stages on biological processes, and these same cycles play an important role in the disposal of civilization's wastes. The environmental concentrations of ammonia, carbon monoxide, and hydrogen sulfide—all poisonous—are biologically controlled. These 'public service' functions of the biological environment cannot be replaced by technology now or in the next century. . . .

The specific mechanisms by which civilization's activities are disrupting the performance of indispensable natural services . . . include selective poisoning of vulnerable organisms and the corresponding disruption of terrestrial and oceanic food webs, alteration of chemical balances in the environment, overexploitation of commercial species, and the destruction of natural communities serving as ecological buffers and reservoirs of species diversity . . .

. . . [M]ankind is systematically diminishing the capacity of the environment to perform its essential functions of pest control, nutrient cycling, waste management, and climate regulation, at the same time that growing population and rising consumption per person are creating even larger demands for these services. Evidently, the inadequacy of present scientific knowledge to predict the time and character of the ultimate breakdown in this process is often taken to be grounds for complacency, but our ignorance here should be alarming, not reassuring.23

So, like Noah, we are adequately forewarned. There is indeed a considerable and awesome risk that humanity could not humanely

21. One must also admit that the attempt to cope with the needs and wants of increased billions of persons may well entail substantial losses of personal freedom, whether or not that attempt is successful. See generally Dubos, supra note 17.
22. Holdren, supra note 13, at 33.
23. Id. at 34.
provide for itself at a population anywhere close to double the 4.5 billion figure of 1981 without seriously damaging the planet's poorly understood chemical-climatic-microorganismic support base for complex life. It is because of this stated risk and for related earth-and-people-caring reasons that the human race should at the very least commit itself to a general population goal. That goal should be to attain as soon as is possible and to maintain for the foreseeable future a level or successive levels of reproduction in every nation no greater than what is needed for that nation's sustained population stability. This latter level of reproduction is what demographers call "the population replacement fertility rate" or, more simply, "replacement fertility."

Due to nations' differences in population mortality rates, the fertility needed for continuous population replacement varies by nation from about 2.1 to about 2.5 children per woman in her lifetime. Currently, replacement fertility rate for the United States means that women would bear an average of 2.1 children in their respective lifetimes. Obviously, prescribing any such maximum societal average for a nation does not necessarily mean prescribing a maximum for the individual person. It does require, however, broad social planning regarding population. A nation expecting any significant amount of net immigration should strive not to exceed a fertility rate that is slightly below replacement rate—so as to offset fully the additional childbearing caused by expected net immigration.

24. 1983 DATA SHEET, supra note 1, at n.8. As of 1980 about 30 nations, among them the United States, had a fertility rate at or below replacement level. See L. BROWN, BUILDING A SUSTAINABLE SOCIETY 151 (1981). Although the total number of such nations now appears to be above 30, there are still more such nations in Europe than in the entire rest of the world. See 1983 DATA SHEET, supra note 1.

Demographers frequently use the "total fertility rate" (TFR) in attempting to describe a nation's fertility. The TFR "indicates the average number of children that would be born to each woman in a population if each were to live through her childbearing lifetime (usually considered ages 15-49) bearing children at the same rate as women of those ages actually did in a given year." Id. at n.8.


26. Throughout this article the term "fertility" refers solely to births per woman and not to any individual's capacity for reproduction.

27. A nation's downward adjustment of its overall fertility rate goal to offset the added childbearing resulting from future net immigration is sound policy: were net immigration to continue indefinitely and the nation's overall fertility rate to remain at unadjusted replacement, its population theoretically would never stop increasing. Although I won't continue mentioning it, the foregoing adjustment is contemplated whenever this article advocates replacement fertility as a societal maximum.
proposal must be examined not only in its mathematical aspects, but in the perspective of an overall concern for human life and the environment.

A. Goal Assessment and Later Goal Modification

This section will assess the reasonableness of the general fertility limitation goal proposed in the previous section, and it will also suggest the probable later need for further goal modification in at least some nations. In assessing the reasonableness of replacement fertility as a proposed fertility ceiling for the world's nations, one must again consider the awesome risk of massive ecological harm. What are the mathematical chances that such harm will actually occur? Man's present state of combined knowledge and ignorance surely requires that the probabilities for massive catastrophe be regarded as substantial. In addition, we can believe reasonably that the larger the world's population has grown by a given date the greater the

Assuming legal net immigration into the United States of 400,000 persons per year, and assuming that the problem of illegal immigration can and will be fairly and humanely brought under effective control, to stay at or below "immigration-adjusted replacement" fertility in the United States would likely require that henceforth fertility rates average no more than about 1.98 children per woman. See Coale, *Alternative Paths to a Stationary Population*, in COMM'N ON POPULATION GROWTH AND THE AMERICAN FUTURE, RESEARCH REPORTS Vol. 1, DEMOGRAPHIC AND SOCIAL ASPECTS OF POPULATION GROWTH 598 (1972). Coale's fertility figure for long-term ZPG with 400,000 annual net immigration is 1.97, but it assumes a perpetual 2.11 fertility rate in the foreign-born population. My figure of 1.98, approximately long-term ZPG fertility for both domestic- and foreign-born American women considered together is simply the average between the 1.97 and 2.11 figures, weighted according to the projected ultimately stabilized relative size of the two groups of persons under the 400,000 annual immigration assumption. Thanks to those women who will bear no children or have only one child in their lifetime, a 1.98 fertility rate does not preclude any woman who wants two children from having them. Nor, for the same reason, is it inconsistent with nature's full dose of multiple births and with some couples' planning for more than two children. This is hardly surprising, for the total fertility rate in the United States currently is reported to be about 1.8. 1983 DATA SHEET, supra note 1. Some demographers, however, suspect that lifetime fertility rates among women in the United States currently of childbearing age will prove to be higher.

At this writing, regular immigration, refugee admissions, and illegal immigration are combining to yield an annual United States net immigration substantially in excess of 400,000 persons. A highly persuasive moral case can be made for the proposition that total annual net immigration henceforth should not be allowed to average more than the foregoing figure. Indeed, we should seriously consider seeking an annual total immigration rate substantially below 400,000. In the United States alone, the resources spent to service the needs of and to create jobs for a large number of immigrants each year could do immensely greater humanitarian good if applied for the next few decades to critically needed international aid that would help hundreds of millions, even billions, of persons. For an excellent, concise analysis of contemporary and future immigration policy ethics, see John Tanton, *International Migration and World Stability* in ALTERNATIVES TO GROWTH—I: A SEARCH FOR SUSTAINABLE FUTURES 243-64 (D. Meadows ed. 1977).
chance for massive catastrophe in attempting to provide for that population. Beyond these two truisms, any quantifications of the risks are nothing but guesses. Nevertheless, we are morally required to guess.

Pretending no expertise, my guess is as follows. If, by continuing present growth rates, humankind reaches a population of over eight billion by the year 2020, less than forty years hence, there is at least a 50 percent chance that millions of human beings will die cruel and untimely deaths as a result of one or a combination of the following scenarios. First, the attempt to meet at least the material needs and minimal material wants of vastly increased numbers of people simply may prove woefully inadequate. Second, that heroic attempt, although superficially more or less successful, eventually may result in greatly increased environmental and ecological havoc causing greater mortality. In fact, a human population growing fast enough to reach or surpass the eight billion mark by 2020, due to the increased numbers of young people, most probably would continue growing rapidly and enormously in the several decades after 2020 unless the growth were tragically ended by catastrophic mortality. Therefore, under the foregoing hypothetical, the chance of a massively tragic outcome by, say, 2060 is apt to be substantially higher than 50 percent.

Even if the probability of tragedy is far lower than 50 percent, the gravity of the risk mandates corrective measures. This moral imperative is illustrated by the following hypothetical situation in a more limited context. Suppose the responsible ground official has good reason to believe and does in fact believe that if he allows Flight 432 to proceed today as scheduled there is a one-in-twenty chance that the plane will fall to the ground, killing the crew and the passengers. Suppose further that the officer decides to disregard this substantial risk and allows the flight to proceed. If the feared risk materializes into tragedy, society is faced with the question of what to do with someone who consciously disregarded a 5 percent risk of his causing the death of others. Assuming there was no need for the flight to take place as scheduled, the officer would almost certainly

28. For evidence that with today's 4.3 billion human population, "human needs have begun to outstrip the productive capacity of many local biological systems as currently managed," see L. BROWN, RESOURCE TRENDS 6-17 (1979) (quoted language at 7). Furthermore, "even six billion people would be excessive for some key resources .... Adequately supporting even [that number] will not be possible without greatly improved management of biological systems, widespread rationing, stringent energy conservation measures, recycling programs, and a more equitable distribution of vital resources such as food, land, and petroleum." Id. at 39.
be prosecuted for negligence, or manslaughter, and perhaps ought to be prosecuted even for murder. This conclusion would apply even if the unjustified 5 percent risk of death had threatened and then killed only one person. The question, therefore, is simply what probability of risk is low enough to be noncriminal when the risk involves millions or billions of human beings or even the very survival of the human species? Unless we abolish the concept of human worth, mankind cannot morally justify taking the ecological risks involved in any more lax a population policy than that of earnestly seeking overall fertility rates of no more than population replacement in every nation currently above replacement fertility. The only limitation on this urgency is that such rates be achieved as soon as can occur humanely. Indeed, as will be explained below, for some future interim even replacement fertility is apt not to be a low enough fertility ceiling for economically distressed nations currently experiencing rapid population growth.

Even those nations which in relation to their human population seemingly have an abundance of forest, fertile land, and other resources should adhere to the replacement fertility ceiling. This is true for at least three reasons. First, there is the extreme unlikelihood of gaining an international consensus as to which nations could prolong their higher-than-replacement fertility rates without substantial ecological or economic risk. Second, one seriously doubts that there are nations today who truly need a larger population. Finally, the population crisis is fundamentally a global crisis. Humanity qua humanity is in grave danger of creating a future in which the total number of human beings is far greater than the world’s ecological, economic, and political resources can service

29. I do, however, agree with Professors LaFave and Scott that “it would be nice, but not possible, to create a table of homicidal risk for purposes of distinguishing among homicidal crimes along some such lines as these:

- Below 1% chance of death—no homicide crime
- 1% to 5% chance of death—manslaughter
- Over 5% chance of death—murder.

W.R. LaFAVE & A.W. SCOTT, JR., HANDBOOK ON CRIMINAL LAW 543 n.6 (1972). I also concur in their use and interpretation of the following nonfictional example:

When defendant fired two bullets into the caboose of a passing train, thereby killing a brakeman, the chances were doubtless much greater that he would not kill than that he would kill. Perhaps the chances of killing were no more than 5%, taking into account the area of the side of the caboose in relationship to the space taken up by the vital parts of its occupants. In view of the lack of social utility in shooting into the side of the caboose, the risk of 5% was held enough for murder in that case. Banks v. State, 85 Tex. Crim. 165, 211 S.W. 217 (1919).

Id. at 543.
on even a minimally adequate basis. If there are nations who still have "too much" forest, fertile land, or other resources and still have "too few" people, under present conditions minimal moral duty to humanity requires that any such nation include itself within the no-greater-than-replacement-fertility imperative.\textsuperscript{30}

There is one arguable exception to the foregoing conclusion. This exception involves the nation that experiences some sort of massive tragedy or a series of tragedies yielding a drastic decrease in its population. If the decrease clearly was not caused by that nation's prior population growth, temporarily above-replacement fertility would be justified in order to offset the population loss to the extent that the regrowth in population would be compatible with economic sufficiency and ecological abundance.

A global commitment to replacement fertility as a maximum norm for every nation is in no sense an extreme response to the population crisis. As was implied in the quoted passage beginning this article, due to very high birth rates of recent decades many nations have record numbers of persons both at or below childbearing age. Because of this demographic momentum, even if the population of every nation immediately could limit its reproduction to an approximate replacement rate, the world's population would continue to increase markedly—albeit less markedly than today—for several decades; it would not reach actual zero population growth until about seventy years had passed and world population had risen to above six billion persons.\textsuperscript{31} On the other hand, there appears to be an attainable goal which will require international aid and cooperation so that all the above-replacement-rate developing nations can gradually reduce their fertility rates to replacement over the next ten years. If this oc-

\textsuperscript{30} But what if nation X fears that its adherence to replacement or temporarily subreplacement fertility eventually could make it vulnerable to aggression from larger or still growing nation Y? Actually, although the growth of modern weaponry has not made population size an irrelevant factor in a nation's military strength, it has, for better and for worse made it much less a critical factor than used to be the case. Nevertheless, if real or imaginary national defense fears should prove to be any impediment at all to reaching an adequate international ZPG consensus, those nations favoring the replacement fertility ceiling and/or any stricter temporary ceiling should forge a common defense alliance. The goal of the alliance should be to guarantee every participating member sufficient military support from the other members to repel aggression against it from any quarter outside or inside the membership. Obviously, the alliance should remain perpetually open to new converts.

\textsuperscript{31} The projection just stated in the text is my rough adaptation of one made by demographer Tomas Frejka in 1973, based on the (also illusory) worldwide attainment of replacement fertility in 1975. See T. FREJKA, FUTURE POPULATION GROWTH, THE POPULATION COUNCIL CENTER FOR POLICY STUDIES WORKING PAPERS at 15-16, 19, 22 (May 1977).
curs, the aggregate population of these nations will come fairly close to doubling before ZPG is actually achieved some time around 2060.\textsuperscript{32} Even in this situation, world population would be approximately eight billion persons.\textsuperscript{33} India, for example, would have to cope somehow with an eventual population of over one billion as compared with today's 700 million. Bangladesh, struggling desperately to feed its present 95 million, would become a nation of well over 150 million.\textsuperscript{34} Indeed, because they are now growing faster than India, most African nations and a large number of Latin American and Asian nations would experience higher percentage increases in population than would India.\textsuperscript{35}

In the context of serious ecological risk and the already vast dimensions of global poverty at the level of real human need, such projections make the following question unavoidable. Is replacement fertility an adequate goal of fertility reduction? Here knowledge eludes us. Due to the gravity of the global ecological crisis and the immensity of existing human deprivation, one must believe that it would be highly desirable for all nations to seek to achieve or continue fertility rates at least modestly below replacement level on a temporary basis. Beyond that, it is very likely that at least some nations with currently high birth rates will to some extent repeat China's decision to seek a temporary rate of fertility substantially below replacement.\textsuperscript{36} They will see that despite generous economic

\textsuperscript{32} This statement is the result both of my very rough adaptation of another Frejka hypothetical projection which had imagined reduction of fertility to replacement in the developing countries by the year 2000, see T. Frejka supra note 31 at 19, and of the accepted rule of thumb that a nation's population growing at 3% per year will still eventually double despite reduction to replacement fertility over a ten-year period, see Gardner, supra note **. The developing nations' population, exclusive of China, is growing at about 2.4% per year.

\textsuperscript{33} One writer projected the world's ultimate population at about 8.5 billion if worldwide fertility were to drop to replacement levels by 1990. See Cherfas, The World Fertility Survey Conference: Population Bomb Revisited, I Science 80 11, 18 (Nov. 1980). My rough interpolation of Frejka's projections would yield a figure somewhere between 7 and 8 billion.

\textsuperscript{34} The World Bank has estimated that reduction to replacement fertility by the year 2000 (about eight years later than my suggested goal) would give India an ultimate stationery population of 1.375 billion and Bangladesh 215 million; that reduction to replacement fertility by the year 2020 would give India an ultimate stationery population of 1.7 billion and Bangladesh 290 million. R.S. McNamara, Address to the World Bank Board of Governors 10-11 (1979). My own "guess-estimates" are but rough interpolations from the bank's awesome projections.

\textsuperscript{35} For a recent listing of current population growth rates by nation, see generally 1983 Data Sheet, supra note 1.

\textsuperscript{36} Concerning China's attempt, see Let Only Two Children Bloom, Science and the Citizen, Scientific American CCXVII (No. 4, Apr. 1980); China's one-child rule halves growth rate, London Times, Oct. 28, 1982, at 6, col. 3.
development assistance their resources cannot be expected to support the substantial population increases that will occur even after their early attainment of replacement fertility. For such nations, fertility rates moderately below replacement—say, fertility of about 1.5 children per woman—will become a temporary necessity. Where there are already signs of severe regional stress, population surging nations would be extremely wise to decide soon to seek moderately below-replacement fertility rates on a gradual temporary basis. Even if they succeed in reaching that temporary goal by the year 2000, they would still experience very considerable increases in population for quite some time.37

The decision to seek temporary, at least moderately subreplacement fertility rates is apt to be an extremely controversial one in any nation that decides to do so. In pursuing the one-child family goal, the Beijing government in China is taking real political and moral risks, including the risk that it may be resorting to or may resort to excessive means.38 One suspects, however, that the Chinese government would not be promoting the one-child family without being totally convinced that such a policy was a prerequisite for China's economic survival and minimal well-being.

It is important that the justifiably controversial question of whether to pursue a subreplacement fertility policy not cast doubt on what should not be controversial: humankind must achieve fertility rates no higher than replacement and must do so as soon as is possible humanely.39

37. Fearing that accomplishment of the replacement fertility goal may not be an adequate response to the population and resources crises, Worldwatch Institute’s Lester Brown has proposed that the developed nations seek actual ZPG by 1985 and that the developing nations reduce birth rates to 25 per thousand by 1985 and then achieve ZPG by about 2015. The resulting stabilized world population would be slightly less than 6 billion persons. See L. Brown, Resource Trends 37-50 (1979). In his later book Brown stretches out his proposed ZPG timetable, asking the industrial nations to reach ZPG by 2000 and asking the developing nations to do so by about 2020. See L. Brown, Building a Sustainable Society 144-51 (1981).


39. Among the strategies that a nation might use to achieve the no-higher-than-replacement or some other lower fertility goal are population education, family planning services, and economic incentives and disincentives. Unless individual reproductive freedom were to be reduced to absolute zero (which is almost as unlikely as it would be undesirable), even after the desired decline of fertility a nation’s overall fertility rate would almost surely fluctuate to some degree from time to time. Because some of those fluctuations are apt to yield temporary “above ceiling” fertility rates, an obvious question of interpretation arises with respect to the idea of a societal “fertility ceiling,” whether that ceiling is set at replacement or at any other
The following would likely constitute a reasonable set of goals. Within the next year or two all developed nations with fertility rates currently above replacement should achieve, and they and all other developed nations should thereafter not significantly exceed, the replacement fertility ceiling. With the help of substantially increased international family planning aid where needed, all developing nations should do likewise approximately by 1992. Nations whose population growth, even with replacement fertility and generous economic aid, is expected to exceed their resources' probable carrying capacity should then move gradually to a temporary fertility rate of about 1.5, reaching this latter goal by about 2000 to 2005.

If the above goals were to be met, the resulting stabilized world population, actual ZPG, likely would fall somewhere between six and seven billion persons, with almost all of the population increase occurring in the developing nations. Under this scenario, there would

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fertility rate: What if a nation experiences one or more years of below ceiling fertility rates but then its fertility swings upward to an above ceiling figure? So long as this subsequent above ceiling situation didn't do more than offset the population effects of the nation's earlier below ceiling rates, should the later situation be viewed as being in compliance with the fertility ceiling? Obviously, a point eventually could be reached where the answer would have to be "yes." Were a nation's fertility to continue fluctuating only or primarily in the below replacement ranges, the nation would eventually need to do what a few industrial nations have already done: seek a temporarily above replacement fertility rate—perhaps the happiest political and social task imaginable—in order to prevent an excessive decline in population. For the overwhelming majority of nations, however, at any plausibly expectable below replacement rate, a shortage of people is simply not the likely problem anytime in the relevant future. Nor would any expected below-replacement fertility rates cause any nation anything near the age distribution difficulties caused us in the United States by the post-World-War II baby boom. Accordingly, at least with respect to replacement as a nation's fertility ceiling, one must say that in view of the ecological burden and risk of servicing even a "mere" five, six, or seven billion human population, for the foreseeable future it would be extremely desirable if even in the case of a nation whose fertility rate had fallen below its replacement rate, that nation would regard any return of its fertility rate to above replacement as an occasion meriting appropriate efforts toward a reduction back to replacement as soon as humanely possible. This approach would reduce the global ecological burden and risk, and it would increase the well-being of all peoples involved.

40. There is neither magic nor precision in the proposed difference in target dates between the developed and the developing nations. Some difference appears necessary and justified for at least two reasons. First, those developed nations not already at or below replacement fertility generally are not far above it, while most of the developing nations are currently well above replacement. Second, the developed nations generally have extensive, highly developed health care systems in which the full array of family planning services either already exists or can be implemented quickly.

41. The resulting world population total would, of course, be affected by the number and size of nations who experienced temporary subreplacement fertility rates, by the amount of
be a substantial deceleration of humanity's present rate of population growth prior to the realization of actual ZPG. In contrast, the six to seven billion population level would be reached substantially earlier as a prelude to much higher levels if present fertility rates continue or slightly decrease and an early massive catastrophe is avoided. The chances of humanity's having adequate preparation time to service the needs of all its future members and to do so in ways that won't demolish or damage the planet's life sustaining vitality would, thus, be vastly improved if the ZPG timetable recommended above were to be accomplished.

B. Goal Assessment Continued

The potential harm even from humanity's rather modest delay past 1992 in complying with the replacement fertility ceiling is staggering to imagine in two respects, both of which threaten massive occurrences of premature death and disease. The first respect consists of the resulting steeper numerical increases in human need that will tax the planet's economic and ecological resources in the decades immediately ahead. The second is the necessarily heavier long-term ecological burden that (absent an earlier catastrophic mortality) the resulting higher total human population would impose. Concerning the latter consequence, consider this example. If the task of achieving a replacement fertility ceiling worldwide takes two decades instead of one, representing success by the year 2002 rather than by the year 1992, approximately one billion human beings will be added to the world's projected stabilized population outcome—an expected total of about eight to nine billion rather than about seven to eight billion persons. Again, one must say, "absent massive catastrophe," the risks of which increase with population. Subject, of course, to this all-too-plausible qualification, scenarios involving substantially greater delays would yield dramatically higher population

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42. The substantial slowing of the growth rate would occur because the fertility rates under the proposed scenario are so much lower than the fertility rates generally prevailing in the developing nations. For a recent listing of fertility rates by nation, see generally 1983 DATA SHEET, supra note 1. The total fertility rate for all the developing nations, exclusive of China, is estimated at 5.2 children per woman. Id.

43. The comparison stated is my gross interpolation from T. FREJKA, supra note 31, at 19 & 22. For consistency, neither of my projections here includes the effect of any possible later subreplacement fertility, a variable whose presence can hardly be assumed with any confidence.
outcomes. For example, the gradual achievement of worldwide replacement fertility over the next sixty years yields a projected world population of over 15 billion.44 Anyone who thinks that a difference in human population of a "mere" one billion is anything other than enormous in its potential ecological impact perhaps has forgotten that the one billion figure was the world's approximate total human population in 1820.

The careful reader is apt to notice my omission thus far of what well may be the most likely array of risks in an overpopulated world: increasingly intense and bitter social conflict; rampant violence and political terrorism; international extortion; epidemics of minor or local wars; and vastly increased chances of nuclear holocaust. I have neglected these risks not because I am able to regard them as unlikely, but because I am convinced that even without them, taking the ecological risks of continued above-replacement fertility rates for any unnecessary duration is itself a morally indefensible policy. When, in addition, we envision the outcomes just enumerated, all of whose probabilities multiply as world population moves higher and higher, we must conclude that any reasonably avoidable continuation of above-replacement fertility rates by the world's nations would be indescribably evil and insane.

There is at least one more illusory intellectual escape from this judgment. It is the supermoral notion that were all humankind religiously to commit itself to a truly saintly degree of economic asceticism, forsaking all the unnecessary gifts of industrial technology, we could postpone the need to worry about population limits for a long time, perhaps even indefinitely. My response is as follows. It is often the case that a proposer of public policy is ethically required to include in his or her proposals a nontrivial amount of citizens' altruistic or enlightened self-denial. Conditions well may require proposing a degree of self-denial that seems politically unrealistic. But to advocate any public policy on an assumption of man's achieving a degree of unselfishness far beyond what could be hoped for plausibly under even the most effective and inspiring political-educational-moral leadership is itself reckless. In short, the overwhelming majority of human beings are not about to be persuaded to forswear all or nearly all the non-necessity benefits of technology and affluence. This is most certainly true in the affluent nations; we are much too irrevocably addicted. Likewise, the

44. See id.
developing nations have received a glimpse of the secular Promised Land of Plenty which is too enticing to settle for an ascetic wilderness. If anything, these added realities require that the chances of ecological disaster from continuing anything like present population growth be revised upwards from that suggested earlier.

This is not meant to imply that the world’s presently affluent peoples won’t be called upon to give up a substantial portion of their environmentally burdensome affluence. Nor is it meant to imply that the developing nations will not have to practice environmental and ecological care in pursuing their economic goals. Put simply, neither the affluent nations nor the developing nations can be expected to show enough economic restraint to make sustained commitment to fertility rates no higher than replacement (and in some cases, temporarily subreplacement rates) an unnecessary or deferrable policy for either group. Otherwise, in the affluent nations substantially increasing population would seriously undercut or vitiate reductions achieved in per capita energy use, resource depletion, and pollution. In the developing nations, where substantial economic growth is needed just to provide everyone with basic necessities, soaring population would increase enormously the aggregate ecological harm resulting from increased per capita GNP. If humanity ignores the need for fertility limits and devotes itself to a quixotic attack upon material consumption alone, its quest for sustainable well-being is almost surely doomed to failure.

IV. Conclusion

In order to regard the existing world population growth outlook with anything other than extreme alarm, we must believe that technology and/or luck and/or prayer\(^4\) can and very likely will supply every single physical resource required to sustain the life and the physical health of both: (a) a rapidly increasing human population in the decades ahead; and (b) a vastly increased human population in the indefinite future thereafter. Furthermore, we must believe that the consumptive economic activities of an enormously increased humankind can be limited (without worldwide subjection to tyranny) to an extent sufficient to preserve the planet’s continued capacity to support massively large numbers of people. Finally, we must believe

\(^4\) But I believe I recall being told that tempting the Lord thy God is a grievous sin. An example would be intentionally jumping from a 20-story window and praying for deliverance en route.
that in a future world where most or all natural beauty would by then surely have been destroyed in trying to meet the enormously increased sum of human want and need, the probable outcome will be this: an immensely larger and far more crowded human race, blessed with an enlarged and more widely dispersed supply of governmental and private weapons of massive and individualized violence, can and will struggle peaceably to meet its needs and, thriving in the best of mental health, compete peaceably for affluence and for other scarce values.

It is, of course, possible that all the foregoing required beliefs, if daringly given the chance, might come true. But ethics, a basic respect for life, prohibits humanity from taking so awesome a set of risks when there is no necessity for doing so. The stakes in human life are simply too high; the risks are simply too substantial. If the technological superoptimists and the ecological superoptimists aren't misleading us tragically concerning the consequences of continued above-replacement fertility, there is a very substantial probability that the moral superoptimists are.