NEGATIVE POPULATION GROWTH

THE NPG FORUM

Reconciling Texas and Berkeley:
The Concept of Optimum Population

by Lindsey Grant

This is the first of a series of NPG FORUM papers exploring the idea of Optimum Population. The author is a retired Foreign Service officer and former China specialist. During his Government career, he was an NSC staffer, member of the Department of State's Planning and Coordination Staff, Deputy Assistant Secretary of State for Environment and Population Affairs, and Department of State coordinator for the ***Global 2000 Report****.*

Images float in the mind's eye. I recall (probably from some long ago Western) a scene of horses in deep grasses, and I remember a quotation in a history book describing the arrival of the Anglos in Arizona a century or so ago: "...the grass was up to the horses' bellies."

More immediately, this year, I was in the Glorieta Pass in northern New Mexico, at a National Monument surrounding the remains of the Pecos Pueblo. It sits on a low ridge partly enclosing a shallow swale. And that little flat valley was a miracle: a profusion of tall grasses and sedges and weeds, full of birds. They owed their existence to their "exclosure"—the specialists love that word—from the effects of domestic cattle grazing.

What have we lost? The ranch that surrounds that little valley is a rich man's ranch, protected from the brutal overgrazing that one sees everywhere in the West, particularly on Indian reservations but also (whatever the statistics may claim) on BLM (Bureau of Land Management) and private lands. But it bore no comparison with that little protected area, for beauty, for diversity of life, or even—for that matter—for the amount of food that it could produce for human use if only we would live within our environment rather than savaging it.

To judge from the newspapers, the nation has discovered that it cannot go on running its affairs as it has. There is a desperate gap between working class incomes and urban housing costs. We are degrading the air, making the climate worse, poisoning our water supplies, wiping out the Chesapeake Bay fishery and the Everglades' wildlife, overgrazing the land, losing soil and damaging our forest resources. We do not know what to do with radioactive wastes. Our bills for garbage are trebling and quintupling, and our cities send trucks to other states and garbage scows wandering around the world seeking a place to unload. There are reports of beaches paved with human excrement.

These problems are driven by three variables: population size, per capita consumption, and the technologies involved—the ways we produce and consume. To put the population aspect more starkly: **At any given level of conservation and technology, the problems are roughly proportional to the size of the population involved.** (I say "roughly" because there are niceties such as threshholds and non-linearities; but they generally aggravate the problem rather than ameliorating it, and the statement remains a good rule of thumb.)

Having recognized the problems, the nation seeks solutions in technological fixes and pleas for conservation. Population has been almost wholly ignored as a part of the problem and of the solutions. It is a bit like a Restoration bedroom farce, with the actors looking for the culprit in every direction but the right one; but this time it is not funny.

There are other problems linked intimately with population and population change, but in more complex ways. As an example, I will later touch upon the interconnected phenomena of growing income disparities, drugs, violence and alienation in the ghetto. These are not simply the results of Reaganite policies. They reflect underlying demographic trends. They are seldom addressed in those terms.

Reconciling Texas and Berkeley

With injustice to some, I typify Texas as the spiritual home of the viewpoint that "I am entitled to a great big air conditioned car, and I have the right to drive it as fast as I want." (Our President is a Texan from Connecticut, and his relaxation is—or was—cruising about in a Cigarette speedboat, a vehicle designed primarily to maximize gas consumption.) I use Berkeley as proxy for believers in alternative life styles, bicycles for transport, and a vegetarian diet so as to feed corn to hungry foreigners rather than American beef cattle.

In order to disengage these two proponents from each other's throat, may I suggest that their differences are driven by a force that neither of them addresses: population growth. To repeat my homily in another form: the big automobile becomes an environmental threat and the steak an immoral diversion of resources only when the number of automobiles begins to exceed the capacity of the atmosphere to buffer the exhaust, or population outruns the capacity of the land to support a beef diet.

Texas need not fear that somebody will take away its air conditioned cars and thereby make life in Texas once again intolerable, **if** it will recognize that its views about them are irreconcilable with its advocacy (among employers, at least) of an unfettered supply of cheap, illegal labor from Mexico.

I choose to believe that a nation that can land men on the moon can learn the pentagonal relationship among

—consumption levels,
—population, and
—environmental sustainability,
—as influenced by foreseeable technologies and
—the availability of capital to apply them.

The more we incline toward the "Texas" view of consumption, the smaller the population the environment can bear.

Freedom, Social Constraints, and Population

Conspicuous consumption is only the subcase. The broader issue is the trade-off between freedom and social responsibility. In the land of the celluloid cowboy, the good people of Los Angeles are already being told that they must give up their backyard barbeques, and before long they will learn that they must trade in their beloved automobiles for their own good and ours.

Everywhere, industrialists and common folk alike chafe at being told by earnest environmentalists that they can no longer behave as they have been behaving. If the friction is intense, and probably rising, it is perhaps because we are traversing the fault zone between two powerful and antithetical world views.

The idea of personal freedom is very strong in this country, and it has deep roots. With a sparse population and a seemingly limitless environment, a man is worth a great deal, and a tree is not worth much. It is probably no accident that John Ball's ringing assertion of the rights of man came in the wake of the Black Plague, when labor in England was suddenly very scarce, and that it found an echo in the Declaration of Independence and Tom Paine three centuries later when this embryonic nation stood on the edge of a wilderness.

Meanwhile, science has been revising Western civilization's image of mankind's place on Earth. That image has shrunk in less than four centuries from a central role, the possessor and beneficiary of a timeless Earth itself central to the Universe—and in personal communication with an anthropomorphic deity concerned about our fate—to one recent species in the extraordinarily complex and evolving ecology of one small planet, associated with a rather ordinary star part way toward the edge of one among countless galaxies. The Earth is no longer an infinite sheltering mother. It is, in Adlai Stevenson's indelible phrase, a fragile space ship.

And we have become aware that we are managing the space ship very badly. We may be appropriating as much as 41% of the Earth's primary terrestrial productivity for human uses.[1] We are suddenly learning the profundity of the risks which we have recently set in motion: the greenhouse effect; an even more dire warning from the 1983 report of the President's Acid Rain Review Panel that human activities may affect "...the denitrifying microbes...upon which the entire biosphere depends."

Those of us who hear and understand such language respond (shrilly) with demands that societies regulate human activities so as to bring such threats under control. Farewell to the heroic—the frontier—image of personal freedom. Enter the era of mutual coercion to save ourselves from the mess we are creating.

Again, there is a trade-off. If the problem is induced in part by population growth, the severity of the mutual restraints will depend on whether we choose to address that source of the environmental pressures.

—not that it will be easy, either to come to a consensus or to act on it.

Maximum Population, "Sustainability" and Optimum Population

This population- freedom trade-off is almost universally ignored. When scientists have dealt with population limits at all, it has generally been at the very crude stage of trying to estimate what maximum population can be fed. It seems to me that this is the wrong question. It would be better to investigate what numbers are **desirable.**

Aside from that, maximum population studies have generally been flawed in two ways:

—They deal with one variable, food, as if the complexity of the Earth could be reduced to an equation of arable land, yields and consumers. (One FAO study—by way of example—simply assumed the conversion of forests into fields wherever it was arable, without considering the likely effects: the loss of firewood to cook the food, the effects on rainfall, water supplies and agriculture itself, the disruption of the ecosystem, the loss of biodiversity, the economic impacts, the broader effects upon climate.)

—It is a one-shot concept. It does not attempt to judge whether its own assumptions would lead to a declining resource base and a decline in the maximum population itself.

"Maximum population" is a slippery number. It has moved up with the burst of agricultural technology. It can move down again as some of that technology proves environmentally unbearable, or as climate changes and fields erode. It can be driven down suddenly by a natural calamity such as drought or a volcanic explosion like the one (Agung) that created the worldwide "year without a summer" in 1816, or perhaps by disruptions such as disorder in oil producing countries.

A maximum population is a vulnerable one, since it has no slack. It cannot drop back to lower consumption levels in the wake of a disaster, except through hunger and disease and rising death rates.

The word **sustainability** has become a rallying point for environmentalists. Briefly, it is the goal of running the world's economies in a way that insures that we pass an undiminished environment to our heirs. It was a central theme of the report of the World Commission on Environment and Development or "Brundtland commission."[2]

The ecological issues facing us have been well described.[3] The reader who is not generally familiar with the evidence must either be remarkably insouciant, or perhaps have a pillow over his ears. I can envy the first and sympathize with the second. For those of us between the two extremes, however, sustainability is a good ethical guideline.

The proponents of "sustainability" have dealt only in passing with population, but they have added a new dimension to the idea of "maximum population." It should not be so large as to degrade the carrying capacity of the system.

Environmental degradation—the failure of sustainability—is eroding carrying capacity in much of the third world and already reducing theoretical maximum populations. We should not automatically assume that the United States is immune. Already, by the standard of sustainability, **the United States is overpopulated or mismanaged, or both, since we are depleting our per capita natural resources and impairing the environment.**

Environmental thinking must take the next step beyond "sustainability." The issue is not just pollution control. We need to bring human activities into better balance with the rest of the Earth's ecosystem. Environmentalists are regularly accused of "caring more about trees than people." The environmentalists are justified; the two forms of life are interdependent, and the people/tree balance has been badly disturbed. We need a way of reconciling the concern for humanity with the broader concern for the system that supports us.

It is no wonder that, from Gaia to Earth Firsters, the era is full of people trying to work their way toward some new philosophy that relates humankind to the totality of Earth. Any such philosophy must incorporate a viewpoint as to how many of us there should be. **Population must be treated, like sulfate emissions, as a variable subject to conscious human decisions.** In some instances, technological fixes alone may be enough, but I doubt there will be many. For an extreme case, take Holland. They have announced an official goal of reducing sulfate and nitrogen oxide emissions 70 to 80%. I think they will find that goal simply unattainable without a dramatic decline in population or living standards—especially as global warming drives the sea higher on their dikes. They do not have a population policy. They are badly going to need one.

Thus enters the concept of **optimum population.**

Population Policy By Default . . .

Here in the United States, there is something of an intellectual vacuum at the center of what is arguably the central issue of our time. The issue is whether and how governments should attempt to influence demographic change. The vacuum is the lack of any systematic way of deciding what the optimum population might be.

I imagine one could find agreement with the idea that Africa or Central America would be better off with smaller populations—even if the thought is dismissed as visionary. The thought is hardly even raised with respect to the United States, and yet there is no necessary reason for assuming that the only possible direction is up.

The Rockefeller commission in 1972 concluded that it saw no benefit from further population growth in the United States, and it proposed family planning and immigration policies to bring that growth gradually to a halt.[4] That was some 40 million Americans ago, and it seems to have been forgotten.

The failure to address the issue does not mean that we are avoiding it. **The United States has a population policy, or policies. We don't think we have one; and that perhaps is the most dangerous of situations.** The decisions the nation takes, about taxation policy, welfare, urban policy and housing, transportation policies, day care for children, abortion or immigration,

will all influence population change, and population change in turn will influence those policies. Perhaps it would be wise to try to understand what we are doing.

. . . Or By Design: Optimum Population

There is an opportunity here for new thinking. Fertility in the United States is now below replacement level, and our population growth is increasingly a function simply of immigration, which—at least in theory—is a variable more accessible to deliberate national control than is fertility. At current fertility levels, the United States would be headed for a turnaround in population growth in thirty or forty years, were it not for immigration. We—like the Europeans who are ahead of us on that curve[5]—should be thinking about the prospect and deciding whether or not we like it. And the results of that thinking should be incorporated in national policies.

The term "optimum population" seems to have originated with Sir Julian Huxley:

> "The recognition of an optimum population size (of course relative to technological and social conditions) is an indispensable first step towards that planned control of population which is necessary if man's blind reproductive urges are not to wreck his ideals and his plans for material and spiritual betterment."

There were, at about the time of the Rockefeller Commission study, at least two academic efforts to define "optimum population."[6] They may seem dated now, but some of the participants argued that one must define optimum population, not in terms of whether you can get away with it, but in order to set a target that would help achieve the greatest human well-being. They did not try to agree on a definition or to propose numbers, but they suggested at least the direction for the inquiry.

Optimum population obviously must be small enough so that we do not endanger the environment that supports us, but it is not dictated by that alone. It is, presumably, **some magic point that best reconciles all the different goals that are related to demography:** prosperity; full employment; maximum productivity per person; livable housing accessible to satisfying employment; social equity and some agreed criteria as to reasonable levels of consumption; national security; open spaces and the preservation of resources; the quality of the air we breathe and the water we drink; leisure; education and cultural amenities; and indeed "liberty and the pursuit of happiness."

The Want of Tools

The process of groping toward "optimum population" will not be intellectually rigorous. That is the fault of the state of the art rather than of the authors. The intellectual disciplines have not been developed to handle complex systems where multiple causes lead to multiple results, and everything is connected.

Keynesian/post-Keynesian economics and the scientific method are the two dominant disciplines of the era, and neither is satisfactory for our purposes. Macroeconomics hinders more than it guides the search for optimum population.

—It is a theory of equilibrium, and it does not contain the concepts for the study of growth or change or scale or limits.

—It puts an economic value upon the processes that destroy natural resources—and it puts a value on the belated efforts to correct the damage—but it does not value the natural world until it enters the economy.[7]

—It puts a value on the supply of amenities that once were free, and thus overstates the well-being of a crowded society as compared to an uncrowded one. One can think of hundreds of economic goods and services that inflate the GNP and create the illusion of prosperity, but in fact simply represent efforts to deal with problems that exist only because of crowding. Starting, perhaps, with parking meters and traffic jams.

The scientific method works best when one can study simple systems with single causes, holding all other variables constant. There is no way within these disciplines, or any others available to us, to come to or defend very precise statements as to what population size would be "optimum."

And there is the problem of value judgements. The dilemma is still with us that Jeremy Bentham encountered (but did not solve) when he stated the goal of "the greatest good for the greatest number." One cannot multiply apples and oranges, or make other than a value judgement in trying to decide which is better: one apple each for four people; or two apples each for two people? There is no scientific way of judging the trade-offs between individual liberty, social responsibility, and the protection of the Earth. These are value judgements, but they must be made.

And there is technological change. Different technologies can support vastly different numbers of people. For the purposes of this exercise, let us assume current technology as a starting point and attempt to identify whether and in what areas technological changes may justify a change in our conclusions as to what population would be optimum. (Labor saving technology may come to seem much less important, and the critical technologies may be those that offer benign ways of increasing agricultural yields and those that reduce pollution.)

And finally, change itself, and the rate at which it occurs, will affect capital formation, employment, education, Social Security and other national interests. (I believe that this can be overstated, but I have dealt with this issue elsewhere.)[8]

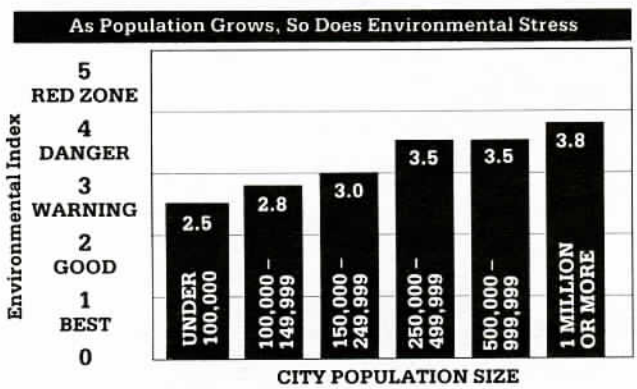
This all being said, there are **new approaches that**

may be of help. "Foresight" systems and "alternative futures" studies offer hope, precisely because they are intended to deal with multiple variables. The emerging methodology of "systems analysis" is an effort to bring mathematical discipline to the study of complex and interacting systems.[9]

There have been periodic journalistic exercises undertaking to measure the "livability" of cities, using nine different indices: climate and terrain; housing (stock, price, heating and cooling costs, mortgage rates and taxes); health care and environment (air and water pollution, hay fever); crime; transportation (how hard is it to get to work?); education; the arts; recreation and sports; and personal economics (living costs, incomes, taxes and jobs).[10]

The high scoring cities tend to be the smaller ones, with living space, stable neighborhoods, low housing prices and low taxes. Despite its climate, a recent winner was Pittsburgh. Its population is down, and the steel industry has gone. It should be a basket case. The common wisdom holds that one must have growth for job opportunities, but Pittsburgh in May 1989 had unemployment of only 4.3%. There must be a lesson in this, and it would be interesting to run a population correlation with that study.

Zero Population Growth, Inc. (ZPG) has attempted such a correlation, using somewhat different indices, and has found that smaller cities tend to have better environmental and living conditions than larger ones.[11]



We should not disdain the simple approach, used in these "livability" surveys, of identifying and weighting the elements of optimum population, and coming up with a composite number.

No study is likely to result in a consensus, but it will have been a useful exercise if it suggests a range, or even a vector from the present level—and if it brings connections into focus that the nation has ignored in its population non-policy.

These suggestions are just a beginning. We need a systematic intellectual framework for studying optimum population, but we cannot simply wait for one. Societies have seldom had the luxury of knowing all about a problem before being obliged to deal with it. We do not have that much time.

The No-Cost Solution

I have generalized about the connections between population and other issues. It will be the province of later essays in this NPG FORUM series to flesh out the details, but let me give a few tentative examples.

Air Pollution, Acid Precipitation and the Greenhouse. Nationally, we are beginning to recognize that we face serious environmental problems. We are trying to deal with them in a typically American way: bull our way through the problem by throwing money at it. President Bush's proposals on clean air are a welcome change from the drought of the Reagan years, but they reflect that mindset. Eventually, we will have to face the issues of how many people? using how many cars? and using them how much? The President's proposals touch only the third of those questions, and only obliquely, and the emphasis is upon technical fixes involving alternative fuels—each of which exacts its own economic and environmental penalties.

Los Angeles' problem is the worst in the nation, and a recent regional proposal for a remedy was estimated to cost $4 billion per year now, and $12 billion per year by 2000.[12]

The scale of the problem is generally proportional to the number of people. We can, and should, practice greater efficiency and seek cleaner technologies, but these are expensive remedies. If our present population were what it was in 1950, there would be about one-third as many people in Los Angeles, and only 60% as many in the United States, and our air pollution problems would be correspondingly smaller.

The same observations can be made, **mutatis mutandi**, about many other national issues.

Energy. As the petroleum era begins to wind down, the United States is crossing the line of 50% dependence upon foreign sources of petroleum, at the cost of a considerable addition to our foreign exchange deficit and at some risk from depending upon unstable foreign sources for a vital share of our energy budget.

If our population were still 150 million, and with current consumption patterns, we would now have the choice of a 17% dependency on imports, or more oil still in the ground—or more likely, both.

Unemployment and the Ghetto. If there is one clear effect of current technology upon the labor market, it has been to increase the demand for certain skills and to reduce the demand for mass labor. Our demographic non-policy and our immigration policies have been precisely the wrong ones for this situation. The baby boom and high fertility among the poor have created a large pool of unskilled labor. Immigration law has favored the immigration of the unskilled rather than the skilled. The failure to enforce the immigration law has permitted an additional influx of workers competing for the bottom level jobs. The results are visible in the impoverishment of the poor in the past decade (while the

rich get richer)[13] and in unemployment in the ghetto. According to current Census and Bureau of Labor Standards statistics, only 55% of blacks in their twenties have jobs, compared with 81% for other Americans in their twenties.

If one seeks causes for the social breakdown and drug problems in the ghetto, or looks for potential sources of unrest, here is a good starting point.

It would be tempting to proceed on to agriculture and other issues, but I will leave them to the specialists who follow. Let me indentify—

The Demographic Role in the Solutions. The most recent Census projections suggest that, if fertility stays where it is and immigration were to be balanced with emigration, the U.S. population would rise slightly to 270 million in the next thirty years and then decline to 220 million by 2080. With net annual immigration at 800,000 (which is a very conservative estimate of the current figure), it would be 333 million in 2080, and rising.[14] A higher immigration rate, which seems likely in view of world population pressures, would of course drive the number higher.

The capital costs of achieving a lower population would be negligible. It would require only a national resolve to limit immigration to refugees most in need of asylum and those potential immigrants who bring needed skills to our economy. Add to that a national goal of "the two child family," and shape social policies (e.g. tax, welfare, housing) to help realize the goal, and we could achieve a lower population more quickly. (If women generally "stopped at two," the total fertility rate would probably decline, since many women have no children).

The two-child family would have other advantages. It is already becoming the accepted norm for more prosperous Americans, if only because of the cost of educating their children. It would provide an equitable rationale for encouraging the poor—and particularly the proliferating unwed teenage mothers—to exercise similar restraint. Since those mothers are frequently poor and unable to provide for their children, such a change would in turn make it easier for society to help educate smaller cohorts of children to participate in the economy and exploit the new technologies. At present, the women having children are the ones who cannot raise them. Women with family incomes over $35,000 average 1.24 children; those with incomes under $10,000 average 2.53. At that rate, the poorest will have more than 16 great grandchildren, the the most prosperous will have fewer than 2.

Moreover, the policy would help to forestall an eventuality that most demographic projections ignore: that fertility and the population may rise if the poor continue to get poorer and as immigrants from high-fertility societies produce a rising proportion of the total population.

FERTILITY, INCOME & EDUCATION
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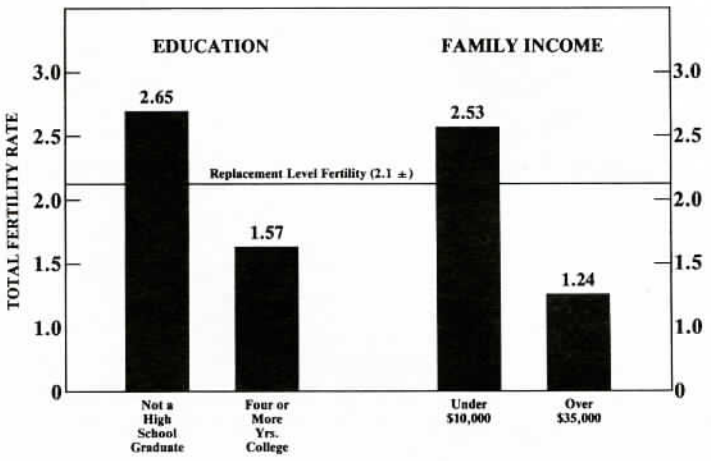

SOURCE: Derived from Table A. "Fertility of American Women: June 1985." U.S. Bureau of the Census.

If we could forestall or deal with the problems through population policy, and if there are very few visible costs in moving toward a smaller population, why not consider such policies?

When these proposals are aired, the usual reaction is "You can't do it." The answer is "We haven't tried."

The Resistances

There are deep resistances, some of them with good reasons, to the idea of a government policy on population.

"Bigger is Better" is a very deeply held feeling in the outlook of a nation that has been expanding for most of its existence, and that sees itself as a nation of immigrants.

Self Interest. As Garrett Hardin showed in "The Tragedy of the Commons", self interest can conflict with the common good. Realtors, land speculators, businessmen looking for a larger market, educators worried about shrinking school-age populations, may all believe their immediate interest is served by growing numbers, even if they recognize that it would harm the community. And private interest usually wins against the public interest when people take positions.

Putting Man in His Place. To people who like children and who were raised on the injunction "be fruitful and multiply," there is something viscerally disturbing about any proposal to consider reversing course. Perhaps this will change as we come to a shared understanding of mankind's place in the system, but the resistances are enormous.

The Fear of Coercion. We have had a tradition of governmental non-interference in personal affairs, and it is a good one. The problem here is a conflict of objectives. It would be nice to keep that pattern, but what does society do if women's choices about fertility are leading to an unsustainable population? As I said earlier, crowded societies do not leave room for the kinds of freedom that uncrowded ones do.

This issue is of course inflamed by the whole abortion debate, and its sensitivity is well illustrated by the furor that Chinese practices have generated in the United States. Lower fertility can of course be achieved without abortions, in theory, but in practice it seldom if ever happens.

We would do well to recognize at the outset that a country embarks upon a delicate course when it consciously brings fertility into social policy decisions (even though there are already inadvertent impacts.) The line between incentives and disincentives and coercion will need to be honestly and publicly debated.

There is a related problem. How does one avoid penalizing the child—who is guiltless even if it is the eighth child—in the process of trying to dissuade the mother from having more children? I think part of the answer is feeding programs directed at the children rather than welfare provided to mothers who might, in any case, be diverting it to drugs.

Finally, there is a real question as to how much governments can do in a free-enterprise society. The historical evidence is mixed. Both recent and pre-World War II efforts in Europe to encourage higher fertility have had very limited success. On the other hand, through some alchemy of incentives and disincentives and public consensus, the so-called "chopstick cultures" of East Asia have done remarkably well at bringing fertility down, and only in China have there been charges of coercion.

It will take patience and good government to thread a way through these issues. Even if all the problems are successfully handled, population change takes a long, long time, as a subsequent essay in this series will make clear.

Responsibility For A Small Planet

The argument is regularly heard that, since natural increase is now largely a third world phenomenon, population control is important for them but not for us, and that one person is one person, whether in Peru or the United States.

That argument founders on the facts of resource use and pollution. One hears the generalization that, with 5% of the world's population, the United States generates one quarter of the pollution. I am not sure that this reflects a serious study, or how such a study would find common units for different kinds of pollution, but certainly with respect to air pollution and climate change, the United States with its present population is a major driving force.

This is not a question of altruism. We share the Earth and the Climate, and we cannot expect that others will reduce their pollution coefficients sufficiently to permit the United States to continue its present ways.

As to the Peruvian migrating to the United States: in so far as he shares in our national life style, he will pollute more than he did in Peru. And we may be sure that one of the first things he will buy, to get to work, is a big old cheap automobile, belching smoke.

Optimize or Maximize

If we do not optimize, we will probably maximize at an unsustainable level, and that is not a very attractive option.

Human tribes have from time to time discovered new technologies or new lands and have prospered for a time, until population growth brought them to the edge once again. In this century **we have had, with the explosion of technology, the greatest opportunity of all to create a world in which all could live decently. And we are in the process of blowing the chance** because we have been willing to control mortality but not fertility. We think of that as a third world process, but migration brings it home.

The United States courts that fate by its population growth. There is no assurance when we will stop growing. Fertility may rise as the population composition changes. As for immigration, Congress has been immune to the demographic implications and responsive to pressure groups. As a result, every "reform" of the past decade has increased the numbers of legal immigrants.

We in the United States still have an advantage that has been lost to Africa, or India, or China, or Bangla Desh. Our range of options is much greater. We have more room for conservation, more money for technical fixes, and we can yield a bit on per capita consumption. We have not driven population up, and consumption down, to the point where the immediate issue is survival. In India, despite the journalistic reports of the "green revolution," all the production gains have not been sufficient to maintain per capita grain consumption at the level of 1900.[15] As anybody familiar with those countries can attest, "maximum" under those circumstances is grim indeed. We have been warned.

We think of our country as a bread basket, but Lester Brown has recently pointed out that the United States in 1988 for the first time in modern history consumed more grain than it produced.[16] With more bad years, perhaps connected with climate change, the first result is more expensive meat, and less of it for the poor. Then, what is the next step? A conscious population policy? another Agung? a gradual erosion?

The choice is ours, but the timing is not. If we do not foresee problems, we will have to try to live with them. If we did **all** the right things tomorrow, we could only slow down the global greenhouse effect; we could not avoid it. If we should come to a consensus tomorrow that the population of the United States should be smaller, it might take a century or more to reach that level. The momentum of change demands a long perspective.

On that note, we invite our readers into the joint exploration of a landscape still only dimly seen.

FOOTNOTES:

1. Peter M. Vitousek et al, "Human Appropriation of the Products of Photosynthesis," **Bio Science,** June 1986, pp. 368-373.
2. UN World Commission on Environment & Development, **Our Common Future.** (Oxford University Press, 1987.)
3. See, for instance, World Resources Institute **World Resources 1988-1989** (New York: Basic Books, 1988), and individual reports by the World Resources Institute, 1735 New York Avenue, Washington DC 20006. Or Lester R. Brown *et al*, **State of the World 1989** (New York: Norton, 1989) and other Worldwatch papers (Worldwatch Institue, 1776 Massachusetts Avenue, NW, Washington DC 20036.)
4. The Commission on Population Growth and the American Future, **Population and the American Future,** March 27, 1972. (Washington; GPO, 1972.)
5. See Lindsey Grant, "Europe in the Energy Transition: the Case for a Smaller Population," in NPG FORUM series, July 1988.
6. See Noel Hinrichs, Ed., **Population, Enviroment and People,** for the National Congress on Optimum Population and the Environment, Chicago 1970. (New York: McGraw Hill, 1971.) And S. Fred Singer, Ed., **Is There an Optimum Level of Population?**, a Population Council book (New York: McGraw Hill, 1971.)
7. To their credit, several economists have experimented with changes in the national accounts calculations to bring resource depletion or expansion into the accounts. See for instance Robert Repetto *et al,* **Wasting Assets: Natural Resources in the National Income Accounts.** Washington: World Resources Institute, June 1989.)
8. See Lindsey Grant, "Too Many Old People or Too Many Americans? in NPG FORUM series, July 1988.
9. For a survey of the cross-sectoral processes of foresight, alternative futures studies and systems analysis, see Lindsey Grant *et al,* **Foresight and National Decisions: the Horseman and the Bureaucrat** (Lanham, MD: University Press of America, 1988.)
10. R. Boyer and D. Savageau, **Places Rated Almanac,** 1985. (Chicago: Rand, McNally, 1985.)
11. **Urban Stress Test,** 1988. Zero Population Growth, 1400 16th Street NW - Suite 320, Washington DC 20036.
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