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22 dimensions of the population

As this excerpt from *Worldwatch Paper 5* points out, population growth and other aspects of human development are directly linked. "Slower population growth is not a magic formula which will solve all our problems. It is one of the means to an end—of achieving a tolerable life for all—and is itself complex and difficult to achieve.

1 Literacy. More than five centuries have passed since Gutenberg invented the printing press, yet one-third of the world's adults lack the skills to use this Renaissance technology. In many countries of Asia, Africa, and Latin America, the number of illiterates is rising as population grows more rapidly than schools can be built and staffed with teachers. Millions of children move toward adulthood without any instruction at all; others enroll in the primary grades but drop out without ever learning to read or write.

Those countries with the least to spend on education and literacy usually have the highest birth rates. Not only are funds in short supply, but the pyramidal distribution of age groups in a rapidly growing population also means that the ratio of trained teachers to school-age children is often decreasing. As a result, many governments once committed to universal education have quietly abandoned this objective.

Rapid population growth, apart from its effects on the quality and quantity of education, tends to curtail the contribution of education to greater social equality. The lack of minimum educational facilities entails the sacrifice of programs to alleviate inequalities between boys and girls, between rural and urban areas, and between favored and poorer sections of so areas, and between favored and poorer sections of society.

2 Oceanic Fisheries. The hope that man will be able to turn to the oceans to satisfy his food needs as population pressure on land-based food resources mounts is being shattered. Newspapers in Tokyo, London, and Lima tell daily of increasing competition in oceanic fisheries and growing conflict among countries over scarce supplies of fish. Overfishing is commonplace and pollution of the oceans worsens steadily.

3 Natural Recreational Areas. Ski slopes, golf courses, beaches, city parks, wildlife preserves, and campgrounds are all utilized by increasing numbers of people each year. Access to what some view as a public resource has become an increasingly sensitive issue as rising population pressure combines with higher incomes to create a demand for more recreation facilities. City dwellers stream out in ever-increasing numbers to seek the therapy of nature. But what they all too often find is the same congestion they left behind—bumper-to-bumper traffic, noise, air pollution, and crowded, overflowing recreation areas. The impossibility of leaving behind the problems of the city plagues affluent and underdeveloped countries alike.

4 Pollution. The absorption of waste is an important natural function of the earth's ecosystem. In the complex web of plant and animal life, what is waste for some organisms is sustenance for others. Only when waste increases to the point where the ecosystem can no longer readily break it down and absorb it does it become pollution. At this point waste begins to affect human health, climate, food production, and the survival of various forms of life itself. Public awareness of the pollution threat is rising, but the ultimate cost of coping with pollution, or of failing to cope with it, is not well understood.

As the human population has increased in numbers and become more concentrated, its potential for disrupting the earth's ecosystem has grown. Each additional person, especially in affluent societies, increases the burden on what is, in many areas, an already overburdened environment. An OECD study of air pollution in Swedish cities demonstrates the link between population density and air pollution. The concentration of sulfur dioxide in the cities' air, the result of burning fossil fuels in cars, generating plants, and industry, was highest in cities with the largest populations.

5 Inflation. During the seventies, inflation has reached double-digit levels worldwide for the first time, creating extreme anxiety among national political leaders who must try to cope with it. The economists whose advice they seek are puzzled by the failure of all traditional inflation controls short of the sanction of widespread unemployment. What few seem to realize is that an important new source of inflationary pressure has emerged.

Inflation results when demand exceeds supply. Monetary and fiscal policies can be used to encourage an unhealthy growth in demand, one that outstrips the growth in supply. Inflation arising from such excessive demand can be controlled by adjusting these policies. In an economy dominated by large corporations and organized labor, inflation can also be of a cost-push nature. Escalating prices lead to demands for higher wages which in turn lead to still higher prices. Inflation also results when supply is temporarily restricted or disrupted by war, labor strikes, or weather.

Such restrictions of supply cause temporary inflation, but during the seventies a new source of long-term inflation has begun to emerge. World demand for goods and services has expanded at about 4 percent per year from 1950 to 1975, nearly tripling during this 25 year span. About half of all production gains were absorbed by population growth, which averaged close to 2 percent per year during this period, and about half by increases in per capita consumption. Meanwhile, it has become increasingly difficult, for a combination of economic and political reasons, to expand the supply of many strategic goods commensurately. The result has been scarcity-induced inflation. The impact of these conditions on the price and availability of such essential resources as food and energy has become dramatically evident during the seventies.

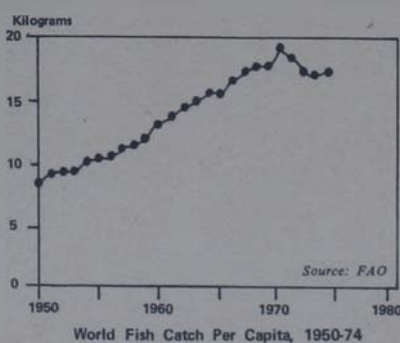
Those who suffer most under the burden of scarcity-induced inflation are the poor, whether in the *barriadas* of Lima or the slums of Naples. Worsening inflation means that those living at subsistence level find themselves increasingly unable to make ends meet. When the price of grain triples, families that already spend 60 percent of their income on food can only eat less.

6 Environmental Illness. A growing share of all illness and death in the world today is directly attributable to human changes in the environment. These changes stem from new technologies, population growth, and the need to produce ever more goods and services to satisfy human needs. Among the illnesses linked to environmental alteration are emphysema, stroke, parasitic infections, heart disease, and cancer.

The spreading incidence of environmental illness is largely attributable to the introduction of new chemicals into the ecosystem, increased levels of air and water pollution, and crowding. The burning of fossil fuels in cities and the spreading use of chemicals and pesticides in agriculture, for example, lead to numerous health problems.

Environmentally induced illnesses take many forms. Horrifying but egalitarian, they spare none; the rich and poor alike are potential victims. No respecter of age, sex, or social status, cancer now ranks as one of the most feared killers in industrial societies. In the United States, it is now the leading cause of death from disease among children under the fifteen years of age. It accounts for a fifth of all deaths in the United States.

7 Hunger. The world begins the last quarter of this century confronted with three interrelated and worrisome developments on the food front. These are the recent downturn in per capita grain consumption, the inability to rebuild depleted grain reserves, and the accelerating world dependence on North American grain exports. Meanwhile, world



Limited arable land is under the pressure of multiplying

population continues to rise by nearly 70 million per year.

Reports in 1974 of rising rates of nutrition-related deaths in several poor countries underscore the need for closer attention to food and population issues. Widespread deficiency-related diseases are sapping the vitality of hundreds of millions, reducing their productivity, alertness, and endurance. Prenatal and infant malnutrition are causing brain damage and retardation in children. Today's malnutrition is shackling tomorrow's generation of adults, injecting a new and unsavory element into development planning.

8 Housing. The flat-roofed, mud-walled dwellings of the Middle East, and the pitched-roof, stilt-supported bamboo houses of Southeast Asia illustrate the variety of housing styles that enrich the human heritage and form an essential part of the "quality of life." Behind this diversity and ingenuity, there is a universal reflection of basic family needs—space for sleeping, eating, child-rearing, and leisure.

Providing decent living quarters for rapidly increasing populations seems dishearteningly difficult today. Housing requires space, building materials, capital, and energy for fabrication. As a result of the swelling demand for houses, the land, lumber, cement, and fuel required have risen beyond the financial means of many of the world's four billion people. The expectation that a growing share of each nation's people would be able to enjoy a home of their own has now been dimmed considerably by the impact of rapid population growth and associated material scarcities.

9 Climate Change. "There can be little doubt that man, in the process of reshaping his environment, has changed the climate of large regions of the earth." So reports a study of inadvertent climate modification by the Massachusetts Institute of Technology. The impact of these climatic changes is far-reaching, affecting human health, living patterns, and food production. As more and more people populate the earth, human numbers and activities threaten to alter the climatic patterns to which mankind has grown accustomed.

In rural areas, human activity affects local climate. Population growth expands villages and intensifies the demand for food. Attendant deforestation, overgrazing, and overcropping change temperature patterns and the humidity balance. Meteorologists Reid Bryson and David Baerreis of the University of Wisconsin report that the atmospheric dust generated by this human abuse of the land may be altering the monsoon patterns, over northwestern India and part of Pakistan.

10 Overgrazing. When human population in the poor countries grows, the livestock population is almost always increased commensurately in order to expand draft power, food supplies, or family wealth and security. As herds of cattle multiply, they can denude the countryside of its natural grass cover, particularly if they are not properly controlled. Overgrazing by goats causes even more damage because it affects trees shrubs as well.

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11 Crowding. The more people there are on earth, the more people there are per square mile. Nothing can change that fact. Four billion of us now live here, and each day there are more. Unless society dramatically reverses recent trends, much of this population will be packed into urban centers. If high population density has negative effects on behavior and health, humanity faces some trying times.

The toll of prolonged stress is visible not only in individuals who suffer premature and irreparable bodily wear and tear as well as functional disorders, also in the social fabric. Sociologists, psychologists, and urban crime victims agree that, in crowded cities, traditional patterns of civil behavior are breaking down as a result of tension, crime and fear of crime, noise, hostility, turmoil, bustle, and brashness. Apart from the stress caused by crowding Philip Zimbardo, a Stanford University psychologist, believes that New Yorkers uncivil behavior stems from feelings of anonymity or "deindividuation," the feeling that "If no one knows who I am, what difference does it make what I do?" Stress transforms neighbors into enemies; it generates fear, insecurity in friendships, and rude behavior.

12 Income. Development economists have traditionally been concerned with population growth because it partially offsets the gains of economic growth. During the sixties, when the developing countries as a group experienced an average annual economic growth rate of close to 5 percent, with population growth rates of 2 to 3 percent, half of the economic gain was absorbed by population growth, while the other half raised per capita incomes.

While the belief that population growth can undermine efforts to upgrade living standards has always been a legitimate one, it is gaining importance. With the perceptible economic slowdown that has occurred in most of the world during the seventies, population growth may offset all economic growth in some countries, actually preventing rather than just reducing any gains in per capita income.

13 Urbanization. During the nineteenth century industrial revolution in England, the flow of people from countryside to city was mainly a result of "urban pull,"—of job opportunities in the city. Today, the process of urbanization has accelerated in the developing countries, but it is more a measure of rural despair than of urban opportunity. Plots of rural farmland are divided and subdivided by each successive generation until the pieces are too small to provide a livelihood. The inevitable result is a rural exodus.

The continuous migration of people from countryside to city in the poor countries constitutes a serious social crisis, the ramifications of which may eventually impair the quality of life of much of mankind. The present growth trend of most primary cities in developing countries can only lead to severe diseconomies, resulting in a higher cost of living and increased per capita costs for urban facilities and infrastructures. Urban scholar Lewis Mumford estimates that providing needed services costs three times as much in a large city as in a small town. Yet cities of over seven million people are more and more com-

mon in developing countries; examples include Shanghai, Peking, Calcutta, Mexico City, Rio de Janeiro, and Sao Paulo.

14 Deforestation. As the human population has expanded over the centuries, the earth's forests have receded. Trees have been cut to make room for agriculture, to provide wood for shelter, firewood for fuel and, in recent centuries, newsprint for newspapers.

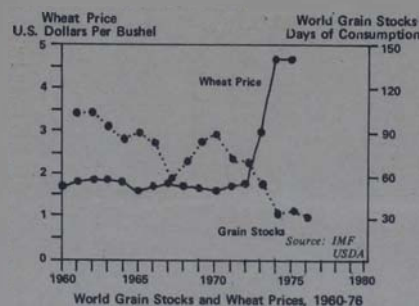
Nine-tenths of the people in many of the poorest countries today depend on firewood as their chief source of fuel. And all too often, the growth in human population is outstripping the growth of new trees—not surprising, considering that the average villager needs nearly a ton of firewood a year. Trees have proved to be one of man's most valuable resources and, in consequence, one of the most heavily exploited.

As other Southeast Asian countries expand and adapt their irrigation facilities to meet burgeoning food needs, their vulnerability to siltation and disrupted river flows will grow commensurately. Satellite photographs of the Philippines show that deforestation is far more advanced than official statistics reveal, with the forest cover probably less than a fifth of the country's land area—a far cry from the 35-50 percent commonly assumed.

15 Political Conflict. As expanding populations exert more and more pressure on limited resources, both local and global, their impact on politics—the task of determining who gets what—becomes increasingly evident. Additional people place additional demands upon a political system at the same time that they impede that system's ability to respond satisfactorily. By constantly complicating resource allocation decisions, population growth can affect not only political stability within national borders but also the relations among states.

16 Minerals. The earth's mineral resources remained untouched throughout most of the estimated two or three million years of human existence. Only in the last century have they been tapped systematically on a worldwide basis. Total mineral production during the last thirty years was greater than that from the beginning of the Bronze Age until World War II. The United States Bureau of Mines estimates that world consumption of aluminum will be twice today's level in nine years, that use of iron will double in a decade and a half, and that demand for zinc will double in 17 years. Consumption of these minerals is growing much faster than the world population, an indication of the substantial role rising affluence plays in the depletion of mineral reserves.

The future availability of mineral supplies at a reasonable cost will depend on expanding reserves and slowing growth in demand. The prospect of cheap, abundant energy that would effectively increase available reserves is fading. On the other hand, dependence on continuous price increases to expand supply would undermine many economies. New technologies—especially recycling, the potential of which has barely been tapped—present opportunities for limited stretching of mineral reserves. Yet the reality that mineral resources have limits is irrefutable, regardless of price and technology. If mined long enough any mineral resource must sooner or later be exhausted.



17 Health Services. For hundreds of millions of people, perhaps half of the world's population, health care is unavailable or is a luxury they cannot afford. In many countries, the number of persons requiring medical care is growing much faster than available health services. This lack of health care is more than a matter of statistics; it is the agony parents endure watching a three-year-old child die of a common childhood disease like measles or diarrhea. It is a father chronically debilitated by intestinal parasites, malaria, or schistosomiasis while struggling to produce enough grain to feed his family.

18 Water. Examples of population growth exerting pressure on water supplies are legion. From Manila—where the population may double in fifteen years—to the grazing range of the Ethiopian Plateau, the limited availability of fresh water is undermining health, restricting food supplies, and diminishing hopes for economic development.

Every person added to the world's population requires a minimum amount of water to survive. Drinking water is only a minute part of a person's daily water needs. Producing enough food to keep one person alive requires enormous quantities of water. Up to 120 gallons of water are needed to grow the grain used in a loaf of bread. A pound of meat, which requires direct water consumption plus water to grow the animal feed, can require 200 times that amount. Energy production is often dependent on water availability, and the production of most consumer products, from plastics to steel, requires a great deal of water.

19 Unemployment. Economists estimate that for every 1 percent growth in the labor force, a 3 percent rate of economic growth is required to generate jobs. With current technology, countries experiencing a 3 percent rate of population growth therefore require a 9 percent rate of economic growth just to maintain employment at its current level. Attaining full employment would require an even faster rate of economic expansion. But economic growth rates have been falling during the seventies rather than rising; fewer jobs are being created even while the number of potential workers is climbing at an unprecedented rate.

20 Endangered Species. The word extinction brings to mind the dinosaur, felled by gradual climatic changes over a long period of time. Today, this process of extinction has been reduced to decades. *Homo sapiens*, a single species, threatens the survival of countless thousands of plant and animal species through its numbers and activities. The addition of three-quarters of a billion people to the world's population over the last decade has, in many regions, upset the balance between human, plant, and animal life. The very size of the human population is altering natural environments: rural habitats are urbanized, forests are turned into farmland. The chemical wastes from manufacturing and commerce, and the widespread use of pesticides and fertilizers to improve nature's productivity threaten to break the life cycles of many species.

21 Energy. Every person added to the world's population requires energy to prepare food, to provide clothing and shelter, and to fuel economic life. The amount of energy used every day by the world's four billion consumers, for everything from heating water to running the most sophisticated computers, is rapidly increasing. Each increment in demand is another claim on shrinking energy reserves.

Prior to the early seventies, there was little concern about future energy supplies and people were unmindful of the role energy played in their everyday lives. Known global reserves of petroleum, natural gas, and coal were expanding and most projections showed that reserves would continue to grow as the price of energy rose and new technology became available. Plentiful, cheap energy permitted the world to grow populous and affluent. Fossil fuels, particularly petroleum, fired economic growth. Nitrogen fertilizer, produced cheaply from natural gas, boosted agricultural productivity in the corn fields of Iowa and in the rice paddies of the Philippines.

With disarming suddenness the global shortage of oil brought on by the 1973 Middle East embargo woke the world from its energy daydream. Lines at gas stations in the U.S. and farmers waiting for days to buy fuel for irrigation pumps in India forced a reappraisal of the global energy situation. Optimism over energy reserves faded as pessimism over supplying ever larger populations with sufficient energy grew.

22 Individual Freedom. As more and more people require space and resources on this planet, more and more rules and regulations are required to supervise individual use of the earth's resources for the common good. This need to agree upon or impose guidelines and limitations is seemingly independent of political ideology. And the sphere encompassed by such regulations is an ever-widening one that includes individuals, large industries, and now, in some instances, the entire world.

The need for more extensive political control is painfully illustrated by the tragedies born of the unregulated use of common resources like air and water. A finite world pressed by the needs of increasing numbers of inhabitants can no longer afford such uncontrolled self-seeking, a Hobbesian universe of the war of all against all. The new political strictures required to cope with the "tragedy of the commons" may necessarily abrogate some forms of freedom. The probable extent of such abrogations can only be speculated upon. □