POPULATION, RESOURCES & ENVIRONMENT:

A Survey of the Debate

Ann F. Wolfgram

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Directed by:

Dr. Maria Sophia Aguirre

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INTRODUCTION

Framing the Debate

Six billion.

It is currently estimated that there is, or there will be shortly, six billion humans inhabiting the planet earth(1). The theme of population, and more specifically, overpopulation has been in the popular mind for the last thirty years or more. Schools, national governments, international legislative bodies, interest groups and the media have all but insured that the public sees the issue of population as a problem, and increasingly, in reference to natural resources and the environment. At the heart of the population-resources-environment debate lies the question: can the earth sustain six billion or more people? How one answers this question depends greatly on whether or not one sees population as a problem.

Is population a problem? Some would argue that yes, population is a problem in that the earth is limited, that it can only sustain a certain number of people (although no one knows what that particular number may be), that the more numerous we become, the poorer we will become. Others argue that no, population is not a problem, but that it is government policies, economic structures and the organization of society that is the problem. Some contend that numbers in themselves do not equal poverty; rather, poorly structured societies and economies foster poverty.

How people perceive the issue of population is critical, for it is by these perceptions that international legislative policies are formed, economic development packages are crafted, federal social and economic programs are formulated, and local sex education classes are designed. Thus, it is equally critical that people ensure that their perceptions are grounded, not in rhetoric and emotion, but in established scientific and empirical data. An accurate understanding of the data will enable people to think and act rationally with regard to population on a local, state, national, and international level.

Perspectives in the Debate Today

There are many groups taking part in the current population debate. All approach the question of population from very different points of view and with different motivations. A working knowledge of the parties and their underlying philosophies will allow one to sift through the diverse rhetoric and hold them up to the light of scientific data. Frank Furedi, in his book *Population and Development: A Critical Introduction*, (1997) has provided a brief outline of the variety of approaches to the issue of population.

- ***The Developmentalist Perspective***. Until the nineties, this was one of the most influential perspectives. Its advocates argue that rapid population growth represents a major obstacle to development, as valuable resources are diverted from productive expenditure to the feeding of a growing population. Some also contend that development in turn solves the problem of population. They believe that increasing prosperity and the modernization of lifestyles will create a demand for smaller families, leading to the stabilization of population growth. A classical account of this approach can be found in Coale and Hoover (1958). It is worth noting that at least until the early eighties, this was the most prominent argument used by many leading demographers and most of the influential promoters of population control. …

  The Redistributionist Perspective. Those who uphold the redistributionist perspective are sceptical of the view that population growth directly causes poverty and underdevelopment. They often interpret high fertility as not so much the cause but the effect of poverty. Why? Because poverty, lack of economic security, the high mortality rates of children, the low status of women and other factors force people to have large families. They also believe that population is a problem because it helps intensify the impoverishment of the masses. For some redistributionists, the solution to the problem lies in changing the status of poor people, particularly of women, through education and reform. Repetto (1979) and the World Bank (1984) provide a clear statement of this approach. This perspective is linked to the Women and Human Rights approach discussed below. Some proponents of redistribution contend that the population problem can only be solved through far-reaching social reform. (See Sen and Grown (1988) for a radical version of the redistributionist argument.)

  The Limited Resources Perspective. This perspective represents the synthesis of traditional Malthusian concern about natural limits with the preoccupation of contemporary environmentalism. According to the limited resources perspective, population growth has a negative and potentially destructive impact on the environment. Its proponents argue that even if a growing population can be fed, the environment cannot sustain such large numbers, population growth will lead to the explosion of pollution, which will have a catastrophic effect on the environment. See Harrion (1993) for a clear statement of this position.

The Socio-Biological Perspective. This approach politicizes the limited resources perspective. Its proponents present population growth as a threat not only to the environment but also to a way of life. They regard people as polluters and often define population growth as a pathological problem. In the West, the ruthless application of this variant of Malthusianism leads to demands for immigration control. Some writers call for the banning of foreign aid to the countries of the South, on the grounds that it stimulates an increase in the rate of fertility. Other writers believe that the numbers of people threatens the ecosystem, and even go so far as to question the desirability of lowering the rate of infant mortality. Abernethy (1993) and Hardin (1993) provide a systematic presentation of the socio-biological perspective.

The People-as-a-Source-of-Instability Perspective. In recent years, contributions on international relations have begun to discuss population growth in terms of its effect on global stability. Some writers have suggested that in the post-Cold War order, the growth of population has the potential to undermine global stability. Some see the rising expectations of large numbers of frustrated people as the likely source of violent protest and a stimulus for future wars and conflicts. The key theme they emphasize is the differential rate of fertility between the North and the South. From this perspective the high fertility regime of the South represents a potential threat to the fast-ageing population of the North (See Kennedy (1993)).

The Women and Human Rights Perspective. This perspective associates a regime of high birth rates with the denial of essential human rights. Those who advocate this approach insist that the subordination of women and their exclusion from decision making has kept birth rates high. Some suggest that because of their exclusion from power and from access to safe reproductive technology, many women have more children then they otherwise would wish. The importance of gender equality for the stabilization of population is not only supported by feminist contributors but by significant sections of the population movement. At the Cairo Conference of 1994, this perspective was widely endorsed by the main participants. For a clear exposition of this approach see Correa (1994) and Sen, Germain and Chen (1994).

The People-as-Problem-Solvers Perspective. In contrast to the approaches mentioned so far, this one does not believe that population growth constitutes a problem. On the contrary, its advocates believe that the growth of population has the potential to stimulate economic growth and innovation. From this perspective, more people means more problem solvers, since human creativity has the potential to overcome the limits of nature. Some believe that in the final analysis, the market mechanism can help establish a dynamic equilibrium between population growth and resources. Others emphasize the problem-solving abilities of the human mind. See Boserup (1993) and Simon (1981) for illustrations of this approach.

The Religious Pro-Natalist Perspective. Some of the most vocal opponents to population policy are driven by religious objections to any interference with the act of reproduction. They argue that population growth is not a problem and are deeply suspicious of any attempt to regulate fertility. Although some supporters of this perspective mobilize economic arguments to support their case, the relationship between population growth and development is incidental to their argument. For them, the argument that population growth is positive is in the first instance justified on religious grounds. See Kasun (1988) for a clear exposition of this perspective. Other pro-natalist voices regard the growth of population of the South as a positive asset that will contribute to a more equitable relation of power with the North. They view population programmes as an insidious attempt to maintain Western domination. (See IPFA(1995)). (2)

Not all people belong strictly to one perspective or another, as Furedi is also quick to point out. In fact, most people adopt different strands of argumentation pulled from the various perspectives. However, some approaches to the issue of population are more specific to particular aspects of the debate. For instance, the ‘People-as-a-Source-of-Instability’ Perspective only touches on resource and environment concerns, and rather deals more specifically with issues of immigration and trade policy.

The History and Origins of the Modern Population Question

Ever since its ascendancy in 1798, the anonymous little tract *Essay on the Principle of Population* has profoundly affected the way in which people think about population and other demographic, economic, and, more recently, environmental issues. Written by the Anglican clergyman Thomas Robert Malthus in the midst of Victorian England's Industrial Revolution, *The Principle of Population* outlined a fascinating vision of the relationship between population growth and what he termed 'subsistence.' Malthus argued that population expanded 'geometrically,' while 'subsistence increases only at an arithmetic ratio.' He believed that man's ability to increase his food supply was constrained in three particular ways: through land scarcity, the limited production capacity of cultivated land, and the law of diminishing returns. Such an idea was riveting in that it predicted a possible scenario where population growth would outstrip subsistence—be it food, land, jobs, or any of the various components that define 'subsistence.'

Malthus himself was a proponent of private property at a time when the socialist ideas of Marx and others were beginning to gain a foothold in the political and social arena. For Malthus, then, private property, specifically private ownership of land, was the means of provision or subsistence for humans. It is significant to note that he wrote his tract at time when England and Western Europe were experiencing great economic expansion. In the late eighteenth century, western society just beginning to experience the effects of the industrialization, and yet this society was organized in such a way that the Malthusian prophecy seemed a possibility. Populations were still quite rural and land-based rather than urban and technology-based; thus one could envision a time when there would not be enough land to go around from which everyone could carve a living.

Malthus felt that his predictions were inevitable, and that population growth and long-term improvements to physical existence could not co-exist. However, it was not

his intent to advocate government-implemented population control policies. In order to forestall what, to his mind, nature and society had determined, Malthus upheld the idea of a 'population optimum' where human numbers would be held in balance with supply. However, he did not promote the use of contraception as a means of achieving the population optimum; rather, his solution was a rational and 'virtuous' abstention from marriage, particularly amongst the working classes. (3) This preventative check of 'moral restraint' would operate in tandem with other positive checks, which would

- > include all the causes which tend in any way prematurely to shorten the duration of human life, such as unwholesome occupations, severe labour and exposure to the seasons, bad and insufficient clothing arising from poverty . . . the whole train of common diseases and epidemics, wars, infanticide, plague, and famine. … Some of these checks, in various combinations and operating with various force …form the immediate causes which keep the population on a level with the means of subsistence. (4)

If it was not his intent to promote overt population control policies *per se*, then what was Malthus' primary *modus operandi* in writing *The Principle of Population*? Frank Furedi of the University of Kent (UK) has pointed out that Malthus' reason for writing the tract was likely to justify the government's economic and social policies which effectively abandoned the working classes.

- > First and foremost, his denunciation of population growth was informed by his opposition to the programme of social reform. Malthus' 'Essay'…was a reaction against the optimistic vision of humanity offered by Enlightenment thinkers. Authors such as Condorcet and Godwin argued that human misery was the product of defective social institutions; for Godwin, social reform held out the prospect of the perfectibility of human beings. Malthus rejected this approach. He argued that welfare measures like the English Poor Laws merely intensified impoverishment, since they allowed the poor to breed more. According to Malthus, any benefits from social reforms would be cancelled out by the consequent increase in fertility, since a larger population would have less food and resources. He mobilized the arguments about the dangers of population growth as weapons in his battle of ideas against social reform. (5)

The ideas contained within *The Principle of Population*, then, were very much informed by the social, economic and historical milieu in which Malthus lived. And while his essay was a reflection on the larger contextual situation, it failed to extrapolate from it a correct prediction that could be later verified by historical experience. No theory can be said to be scientifically or empirically

proven if that theory can not be verified by several trials where its predictions come to fruition every time. In this respect, the test of time has not been kind to Malthus.

Malthusian Theory Explained

In order to have a clear understanding of Malthus' 'Principle,' it is necessary to look closely at the logic underlying his argument. He stated that population increases 'geometrically' or exponentially and that subsistence increases arithmetically. Thus, population increases along the order of 1, 2, 4, 8, 16, 32..., whereas subsistence limps along at the rate of 1, 2, 3, 4, …. . Stanford economist Nathan Rosenberg provides a vivid illustration of how such a scenario might be worked out. He writes:

- > Malthus…developed [a] model of growth that can best be understood by thinking of Great Britain as a huge farm, of fixed acreage, confronted with a potential for rapid population growth. Such growth leads to an increase in the output of products, as more labor is applied to a fixed amount of land. But, although output does indeed grow, the increments to output grow at a declining rate due to the law of diminishing returns. Eventually population growth will lead to a situation where diminishing returns drive up the incremental output of additional labor down to zero—that is, at some point the addition of yet another laborer to a farm of fixed size yields no increase whatever in the output of food. At such a point, even though the working population receives no more than a bare subsistence wage, wage payments eat up—literally—the entire output of the economy. Further growth is impossible because no nonwage income is available for capital formation. The economy has arrived at a so-called stationary state, where population has grown to its maximum size and the bulk of the population is living at a bare subsistence level. (6)

As can be seen in the above illustration, there are several factors at work: 1) in a situation of fixed resources, population growth directly affects consumption; 2) with capital as a fixed variable, the production per worker falls with the addition of each new worker—this is the classical law of diminishing returns; 3) an increasing population implies a population with a large base of children who are both consumers and non-producers—thus, less production per capita; and 4) at a fixed income, population growth will shift investment from savings and human-capital development to subsistence. (7)

In addition, an important and key assumption to this logic is the *ceteris paribus* assumption, where all other variables in the logical equation are assumed constant and fixed. If this assumption holds true and all other elements in the population equation are constant, then Malthus' theory regarding population would also be valid. In addition, it would imply a direct relationship between population and subsistence, where increases or decreases in one would cause the inverse in the other: if population increases, then subsistence decreases; if population decreases, then subsistence increases. Historically, however, this has not been the case. The variables in the population equation have shown themselves to be changing and inconstant; in addition, new variables are included into the parameters of the equation all the time. Variables such as technological improvements, biotechnology, the expanding human mind and ingenuity, the unpredictability of nature itself, and sheer luck, amongst other things, have mitigating effects on any relationship between population and subsistence. It is precisely because the *ceteris partibus* assumption does not hold in the logic of Malthus' population equation that his predictions have not come about.

The Practical Failure of Malthus

Fortunately for mankind, the dire prophecies of Malthus never arrived. Mitigating factors such as technological developments, agricultural developments, changes in societal organization, and changes in governmental policies, among other things, enabled humanity to avoid a situation where the number of people was greater than the capacity to sustain them. Malthusian theory then fell to the wayside as a result. These factors, coupled with a prevailing attitude of progress borne out of this period of frenetic economic development, expansion and invention, brought about the quiet demise of the Malthusian contention.

This optimism was also coupled with another powerful economic, demographic, political and racial idea: social Darwinism. From a social Darwinist perspective, high fertility was thought to be a sign of the strength and vitality of a given nation or race. This widespread and popular belief certainly had consequences in political and economic theory: more numbers of citizens equalled greater military security and greater economic growth. (8) In addition to secure borders and a thriving economy, governments

wanted to encourage fertility amongst those who were judged ‘fittest’ physically and morally. As Furedi points out:

- > The belief that large sections of the lower classes were ‘unfit’ coincided with the recognition that this section of the British race reproduced far faster than the more solid middle classes. The fear that the lower classes would outbreed the rest and contribute to the degeneration of the race helped foster a climate where eugenic views could flourish. From the eugenic point of view the problem was not the level of population growth as such but the tendency for the lower—and by implication morally inferior—classes to increase at a faster rate than the middle class. (9)

At the turn of the twentieth century, social Darwinism was in vogue in intellectual, political and social circles. It is at this time that organizations such as the Eugenics Society (later renamed Planned Parenthood Federation) came into being and gained popularity. However, following World War II and the experience of the Nazi Holocaust, social Darwinism and ideas of racial ‘fitness’ quietly faded into the background. Ideas of superiority or inferiority were no longer acceptable modes of speaking about population and population control. (10)

Malthus Revived

It has been only in the last thirty years that Malthusian theory has once more gained an audience in the population debate. The oil crisis of the 1970s and the famine in parts of the Sahel in Africa in the 1980s all seemed to vindicate Malthus. It seemed that he had been right, that human numbers had outstripped the ability to sustain them, not only with regard to food, but also with regard to resources such as oil, minerals, land, and water. In 1968, two influential ‘neo-Malthusian’ works were published, reintroducing the language of limits into the population debate. Ever since Paul Ehrlich’s *Population Bomb* (1968) and Garrett Hardin’s "Tragedy of the Commons" (1968), warnings about the limits of sustenance, of resources, food, energy, land, the environment, have flown fast and furious. Vociferous in their attacks on population growth, neo-Malthusians have captured the attention of the popular media and politicians alike. However, they are not without their flaws and their critics.

The Failure of Neo-Malthusian Claims: the Example of Food Supply

The foundations of the neo-Malthusian claims are familiar and are just as faulty as the original Malthusian argument. The *ceteris partibus* assumption, the fixed resource assumption, the fixed capital assumption, and the assumption that population and resources are directly linked are all carried forward into the contemporary debate, with little attempt made on the part of neo-Malthusians to address these fundamental weaknesses. Thus, with complete but unfounded confidence, Paul Ehrlich could claim in 1968 that ‘hundreds of millions’ of people would die of starvation by the 1970s, that 65 million Americans would starve, that the population of the U.S. would decline by 22.6 million persons, and that England would cease to exist by 2000. (11) More recently, Mr. Ehrlich, writing with Anne Ehrlich, renewed his prediction in *The Population Explosion* (1990), although with more caveats, since his original predictions failed to materialize.

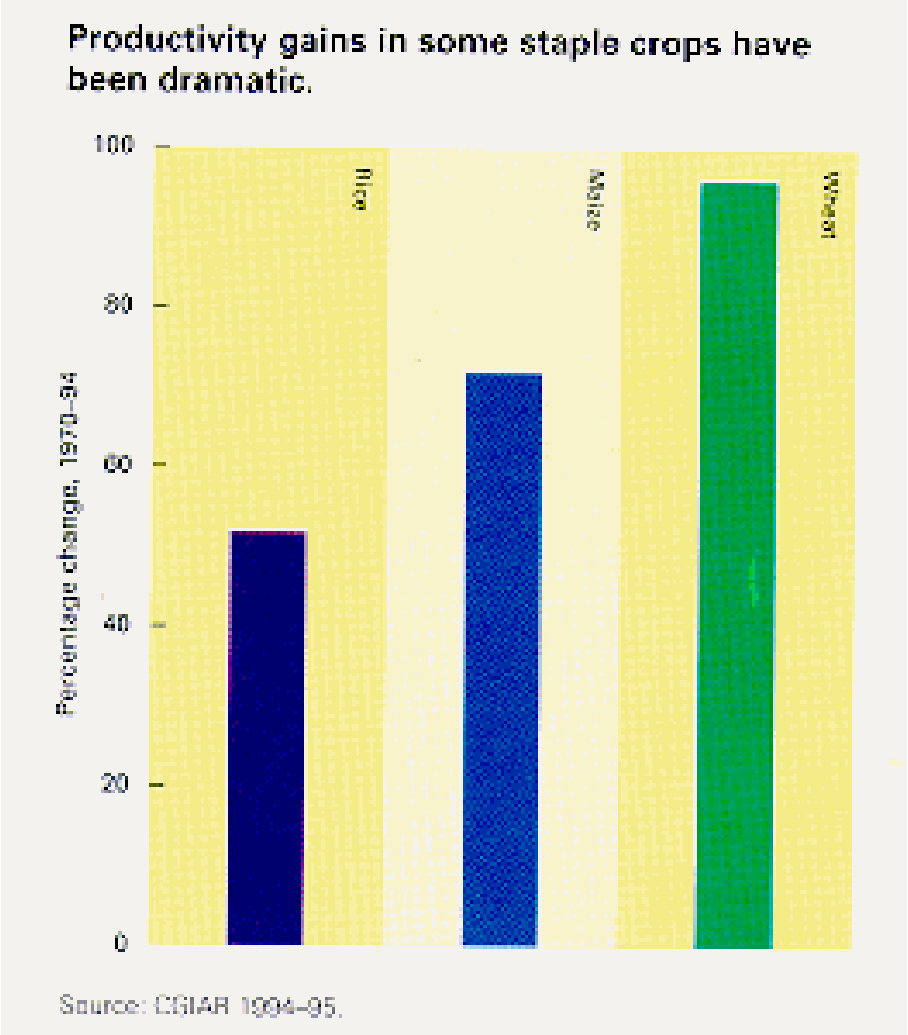
- > The population connection must be made in the public mind. Action to end the population explosion *humanely* and start a gradual population decline must become a top item on the human agenda: the human birthrate must be lowered to slightly below the human death rate as soon as possible. There still may be time to limit the scope of impending catastrophe, but not *much* time. … More frequent droughts, more damaged crops and famines, more dying forests, more smog, more international conflicts, more epidemics, more gridlock, more crime, more sewage swimming, and other extreme unpleasantness will mark our course. (12)

And so, despite the earlier failure of Thomas Malthus’ predictions and his own 1968 forecast, Ehrlich and other neo-Malthusians persist in calling for a future of doom. Lester Brown, of the Worldwatch Institute, has for years foretold famine. As recently as September 1998, he argued that the ‘frontiers of agricultural settlement have disappeared [and] future growth in grain production must come almost entirely from raising land productivity. Unfortunately this is becoming more difficult." He bases this prediction on the following data:

- From 1950 to 1984, growth in the grain harvest easily exceeded that of population, raising the harvest per person from 247 kilograms to 342, a gain of 38 percent. During the 14 years since then, growth in the grain harvest has fallen behind that of population, dropping output per person from its historic high in 1984 to an estimated 317 kilograms in 1998—a decline of 7 percent, or 0.5 percent a year. (13)

These data do not correspond, however, to statistical data regarding crop yields produced by international bodies such as the United Nations and the World Bank. Both released reports that point out that world is no where near the mass starvation predicted by Ehrlich or Brown. For instance, the 1999 Human Development Report, published by the United Nations Development Programme (UNDP) pointed out that "despite rapid population growth, food production per capita increased by nearly 25% during 1990-1997. The per capita daily supply of calories rose from less than 2,500 to 2,750 and that of protein from 71 grams to 76." (14) In a similar fashion, the World Bank devoted a segment of its Development Report to refer to the Green Revolution as a ‘paradigm’ for development and knowledge-sharing. It is through human ingenuity, the World Bank argues, that food production has stayed ahead of population growth; indeed, productivity gains in cereals such as rice, maize and wheat have been dramatic. (15)

Growth in Yields of Principal Cereals



Source: World Bank Development Report

The example of the neo-Malthusian failure to produce sound projections in the example of food supply is due to a lack of sound data and sound logic. In like manner, the neo-Malthusian perspective encounters the same difficulties when grappling with the aspect of resources and environment in the population debate.

Malthus, Population, Resources, and Environment

The temptation to assume to a direct, causal relationship between population and food supply is characteristic of Malthusian theory, as well as the neo-Malthusian treatment of every aspect of the population debate. The related issues of natural resources and environment are no different in this respect. As Furedi points out, there are two main sub-categories within the neo-Malthusian bloc—the 'Limited Resource Perspective' and the 'Socio-Biological Perspective.' The former takes the classic Malthusian argument and applies it to all natural resources, while the latter, almost acting as a sub-set of the former, treats the environment as a limited resource and regard people as a threat to the biodiversity and ecological balance of that resource.

There are several quite potent criticisms of the neo-Malthusian perspective, as was pointed out earlier. Proponents of statistical and scientific integrity point to dubious data or to misinterpretations of data. Supporters of a free-market response argue that the market will correct for inefficiencies, and that carefully constructed initiatives can help to guide the market, particularly in the area of environmental protection. There are also those who criticise the current economic and social structures in societies today. Furedi would perhaps refer to them as the 'Redistributionist Perspective,' which perhaps inadvertently carries Marxist overtones. However, whether it be a Marxist perspective calling for a dramatic re-distribution of wealth, power, and knowledge or those who criticise the neglect and failure to acknowledge the dignity of the poor by wealthier peoples, all those within this 'Structural Response' group point to weaknesses in societal organization in some way. The 'People-as-Problem-Solvers' perspective also criticises the neo-Malthusian tendency to disregard human dignity and creativity, thereby failing to acknowledge the human person as the 'ultimate resource'. Finally, the 'Religious Pro-Natalist' perspective takes issue with Malthusian-derived policies which interfere with the right of a married couple to decide on the number of children they would like to have. In the following section, each perspective will be addressed, first with regard to the issue of population and resources, and then to the related issue of population and environment.

RESOURCES

The Neo-Malthusian Perspective

Neo-Malthusians consistently argue that natural resources are absolutely limited and finite. Again, such an argument rest heavily on the *ceteris partibus* assumption—that all things in the population-resource equation remain equal. Many commonly refer to this limited state as the earth's 'carrying capacity.'

One writer defines 'carrying capacity:'

- > The error, we repeat, lies in trying to define overpopulation in terms of density; it has long been recognized that density per se means very little. The key to understanding overpopulation is not population density but the numbers of people in an area relative to its resources and the capacity of the environment to sustain human activities; that is, to the area's carrying capacity. When is an area overpopulated? When its population can't be maintained without rapidly depleting nonrenewable resources (or converting renewable resources into nonrenewable ones) and without degrading the capacity of the environment to support the population. In short, if the long-term carrying capacity of an area is clearly being degraded by its current human occupants, that area is overpopulated. *By this standard, the entire planet and virtually every nation is already vastly overpopulated.* (16)

But does this correlate with scientific findings? Are we really running out of land and other resources? Can the 'carrying capacity' for a given area grow? To answer these questions, it is necessary to look at particular natural resources and assess whether or not they are limited in the strict sense for which neo-Malthusians argue.

Land

Scientific Evidence: In 1968, Garrett Hardin's "Tragedy of the Commons" contended that users of a common resource (water, land, air) will inevitably destroy the very resource upon which they depend. A classic neo-Malthusian argument for natural limits, Hardin's article was seminal to the population-resources debate. Recently, however, scientists have countered Hardin's case by pointing out that methods can be developed that will allow for sustainable use of common resources. Elinor Ostrom *et al* argue that

- > Although tragedies have undoubtedly occurred, it is also obvious that for thousands of years people have self-organized to manage common-pool resources, and users often do devise long-term, sustainable institutions for governing these resources. It is time for a reassessment of the generality of the theory that has grown out of Hardin's original paper. … An important lesson from the empirical studies of sustainable resources is that more solutions exist than Hardin proposed. (17)

Ostrom *et al* go on to argue that common-pool resources can be managed in a variety of ways, utilizing both local collective agreement and governmental regulations to one degree or another. They found that community based regulation works most effectively for local or regional resources, but that such solutions would need to be altered for global common-pool resources such as the oceans and air. This finding was confirmed by a second group of scientists, who also pointed out that collaboration between scientists and local enables the creation of sustainable environments for both humans and wildlife, which can also be an economic boon for the community. "Community-based natural resource management accepts that much of the state of ecosystems rests with local people and, therefore, the technology that can contribute to the sustainable use of natural resources is best used by local people." (18)

People-As-Problem-Solvers: There are many aspects of the scientific studies mentioned above that lend themselves to the 'People-as-Problem-Solvers' perspective. With regard to land use, as with most other resources, most in this perspective would argue that it is not so much an issue of the quantity of arable land, but rather how those lands are utilized. They also contend that it is a question of utilizing human ingenuity—technology—in order to maximize production in a sustainable fashion. Thus, when the variable of technology is added to the equation, land is no longer seen as a limiting factor in sustaining human life.

In addition to arguing that there is not enough land to support humanity, some have argued that we are actually losing existing arable lands through poor farming practices. Julian Simon has pointed out that, according to empirical studies, we actually require less land to produce more and that "the reduced economic importance of land is shown by the long-run diminution in the proportion of total tangible assets that farmland has represented in various countries." (19) Thus, the total amount of arable land aside, technological and agricultural developments have made it possible to produce more on less ground. He has also pointed out that the official UNFAO data demonstrate that agricultural land as a percentage of the total land area has increased over the last thirty years, from 33.13% to 35.71%. Most of the large gains have occurred in developing areas such as Latin America. In the same period, arable land as a percentage of total land area has also increased, from 10.41% to 11.03%. (20) While Simon and others do not discount the occurrence of desertification, they believe that most claims regarding desertification are unfounded and overblown. They also point out that it is most often due to poor land management practices, particularly on government-owned public lands. Thus, they argue that the perceived loss of land is just that—perception, lacking statistical support.

Food

Scientific Evidence: As was pointed out earlier, global food production has enjoyed tremendous gains over the last twenty years. Most of these gains are due to the technological advances made through the 'green revolution.' Recently, though, there has been concern in some sectors that the green revolution has 'lost its edge' and is no longer able to ensure that production levels keep pace with population growth. However, this view does not take into account that current yields are not at 'best practice' levels. While many farmers in developed and developing nations alike have taken advantage of green revolution methods, many are not maximizing these methods and other farming techniques to increase production and reach potential yields. Many scientists are optimistic that a new revolution can be achieved through better techniques and through bioengineering.

- > 'People have been predicting yield ceilings for millenia, and they've never been right,' says Matthew Reynolds, a plant physiologist at CIMMYT. Indeed, some skeptics argue that the slowdown in productivity growth might actually be a sign of progress, because it shows that many nations are enjoying food surpluses. As for meeting future demand, they say, it is a good bet that some of the many efforts to re-engineer crops will pan out. 'If I were an agricultural policy developer in a developing country today, I'd be worried about too much food in the world than too little, because it would drag the prices down,' says D. Gale Johnson, an agricultural economist at the University of Chicago. With varying degrees of caution, official projections from the World Bank, FAO, and IFPRI agree with Johnson: Agricultural researchers can repeat the Green Revolution. (21)

Even with apparent slowdowns in agricultural production—again, this may be due to surpluses or other governmental policies such as the USDA-run CRP program—statistics from the United Nations Development Programme's *1999 Human Development Report* show that food production per capita increased 25% during 1990-1997. (22)

In light of all these statistics, it is also important to note that such data usually address the three major grains used worldwide: wheat, rice and maize. In the last few years, researchers have pointed to the need to develop native grains in areas such as Africa. Grains such as millet, tef, sorghum, and African rice thrive in areas where others fail: "African grains tend to be hardy, less dependent upon large amounts of water or irrigation, and more heat and drought tolerant than other major cereals." (23) Thus, there is a lot of room for further development in grain production.

People-as-Problem-Solvers: There are many points of contact between scientific evidence and this perspective. Agricultural and technological advances lead to an increase in crop yields. Improvements in farming techniques and better land management also lend themselves to increased productivity.

Redistributionist/ Structure Response: In its most recent World Development Report, the World Bank held up the green revolution as a model for knowledge-sharing that enabled further agricultural and economic development in developing and underdeveloped countries.

- > Few stories better illustrate the potential of knowledge for development—or the obstacles to diffusing that knowledge—than that of the green revolution, the decades-long, worldwide movement dedicated to the creation and dissemination of new agricultural knowledge. This quest, breeding new seeds for enhanced agricultural productivity, was undertaken in the early postwar years by a vast array of agents—nonprofit organizations, governments, multilateral institutions, private firms, banks, village moneylenders, land-rich farmers, and landless laborers—all working, deliberately or not, to improve the daily bread (or rice, or maize) of people everywhere. The English economist Thomas Malthus had predicted in the 18th century that the population of any country would eventually outstrip its food supply. What the green revolution showed instead was that Malthus had underestimated how quickly knowledge—in agriculture, in transportation, in mechanization—would transform food production. By the second half of the 20th century, world food supply was more than keeping up with population growth. (24)

Thus, it is through the exchange and distribution of knowledge and ideas that food production can be increased in developing areas that were once unable to provide for themselves. The World Bank argues that if such knowledge-sharing took place in other sectors, greater development would occur in poor areas.

Water

Scientific evidence: A current topic in the population-resources debate is whether or not there is a finite character to water. The neo-Malthusian position, of course, argues that there is finite availability in the water supply. Proponents of the human/ technological advancement front typically argue that water is not limited in the sense that there is not enough to support human life.

According to scientific experts, "whatever benchmark is taken, the precise amount [of water] has no absolute significance; scarcity is a relative concept and can occur at any level of supply, depending on demand and other circumstances. … A society confronting water scarcity usually has options. Scarcity is not necessarily inevitable or immutable." (25) Ramon Llamas, chair of the Working Group for Ethical Use of Freshwater for UNESCO, has pointed out that while we do not actually know how much water there is on earth, it has been estimated that each human being requires 1000 cubic meters (m^3) per year to meet basic needs. However, such estimates can be misleading. Llamas points to the example of Israel, where there is only 500m^3 per capita annually. On the face of it, Israel has failed to meet the accepted water standard, yet this state of affairs has not impeded its development. (26)

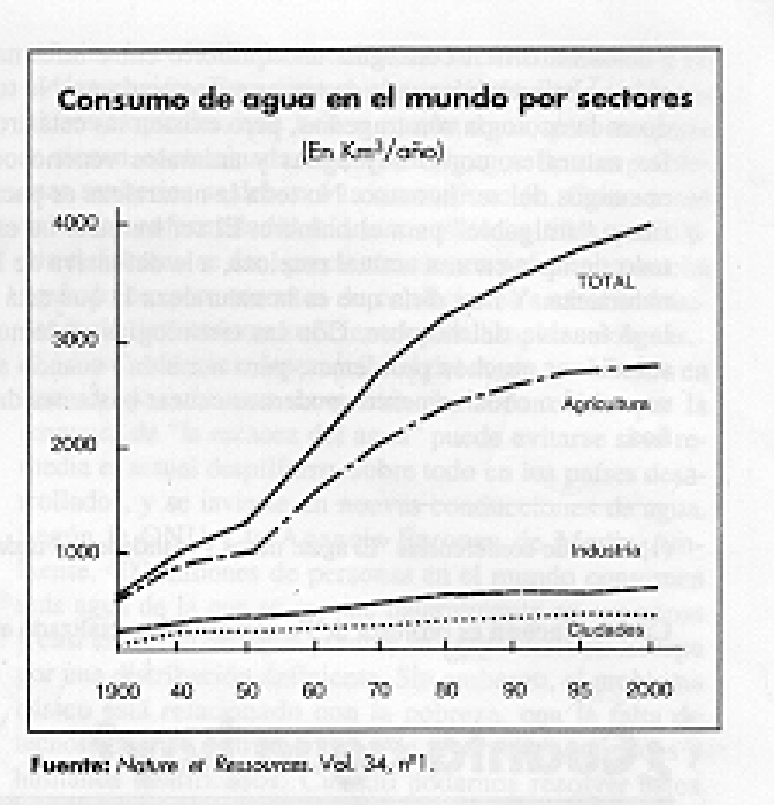
The real water problem, hydrologists say, is not the quantity of water, but rather the way it is distributed. The disparity in consumption rates points to this: 600 liters/person/day are used in the United States, 200 liters/person/day in the EU, and 30 liters/ person/day in Africa. Current water availability stands at 7500m^3 per person per year and 96% of the world population has 1000m^3/year available to them. (27) However, while water may be available, there again are problems with distribution and contamination in poorer regions of the world.

People-as-Problem-Solvers: Simon (1996) has argued that water, like most other resources, is ‘a product of human labor and ingenuity. People ‘create’ usable water, and there are large opportunities to discover and utilize new sources.’ (28) The question of possible water scarcity aside, water can be used in more efficient ways, again creating more productivity while utilizing less of the resource. Water researchers like Sandra Postel think that technological innovations such as drip irrigation will utilize water more efficiently than the traditional flood irrigation methods. (29) An FAO fact sheet contends that methods such as water harvesting or collecting runoff for irrigation of crop and pasture land can increase yields and reliability of production. They cite the experiences of Sudan, Burkina Faso and Kenya, where "rain harvested from one hectare for supplementary irrigation of another can triple or even quadruple production." (30)

Redistributionist/ Structure Response: There are obviously many points in the scientific evidence that converge with the redistributionist perspective. The problems of distribution and of divergence in water consumption rates both confirm their contention that with regard to ‘limited availability,’ the heart of the matter is not the total amount of water but the usage of known quantities. Ramon Llamas notes that a golf course (a favorite pastime for developed nations) requires as much water as an alfalfa field. (31) Thus, an additional ethical question needs to be put forward: are we using water correctly? Water that could be used to grow crops is used instead to ensure smooth greens and lush fairways. These questions are still being debated in intellectual and policy-making circles.

Global water Consumption by Sector (Km^3/year):

Agriculture, Industry, Cities



Source: Aceprensa

Minerals

The resource category of minerals is, by nature, varied and broad, encompassing minerals such as copper and coal. In recent years, the mineral that has drawn the most public attention has been petroleum, particularly in reference to consumption and perceived scarcity. Because it is such a well-known mineral, let us take petroleum as a case-in-point for minerals as related to the population-resources question.

Neo-Malthusian approach: In years past, the main concern coming from this sector was fear of total mineral resource depletion. In an on-going public debate between Lester Brown, of the Neo-Malthusian school, and Julian Simon, Simon wagered that mineral resources were not being depleted, because price, which reflects scarcity, did not rise but declined in the long-term. Simon won the wager. (Simon's position will be discussed later in this section.) In recent years, the neo-Malthusian argument, especially with regard to petroleum has shifted from concern over resource depletion to effects of mining and mineral usage on the environment. Fears over land degradation due to mining, air pollution due to burning petroleum, water pollution due to oil spills and industry waste, among other things, are now the main thrust of the neo-Malthusian argument with regard to minerals resources, petroleum in particular. These will be discussed in a later section devoted to population and environment.

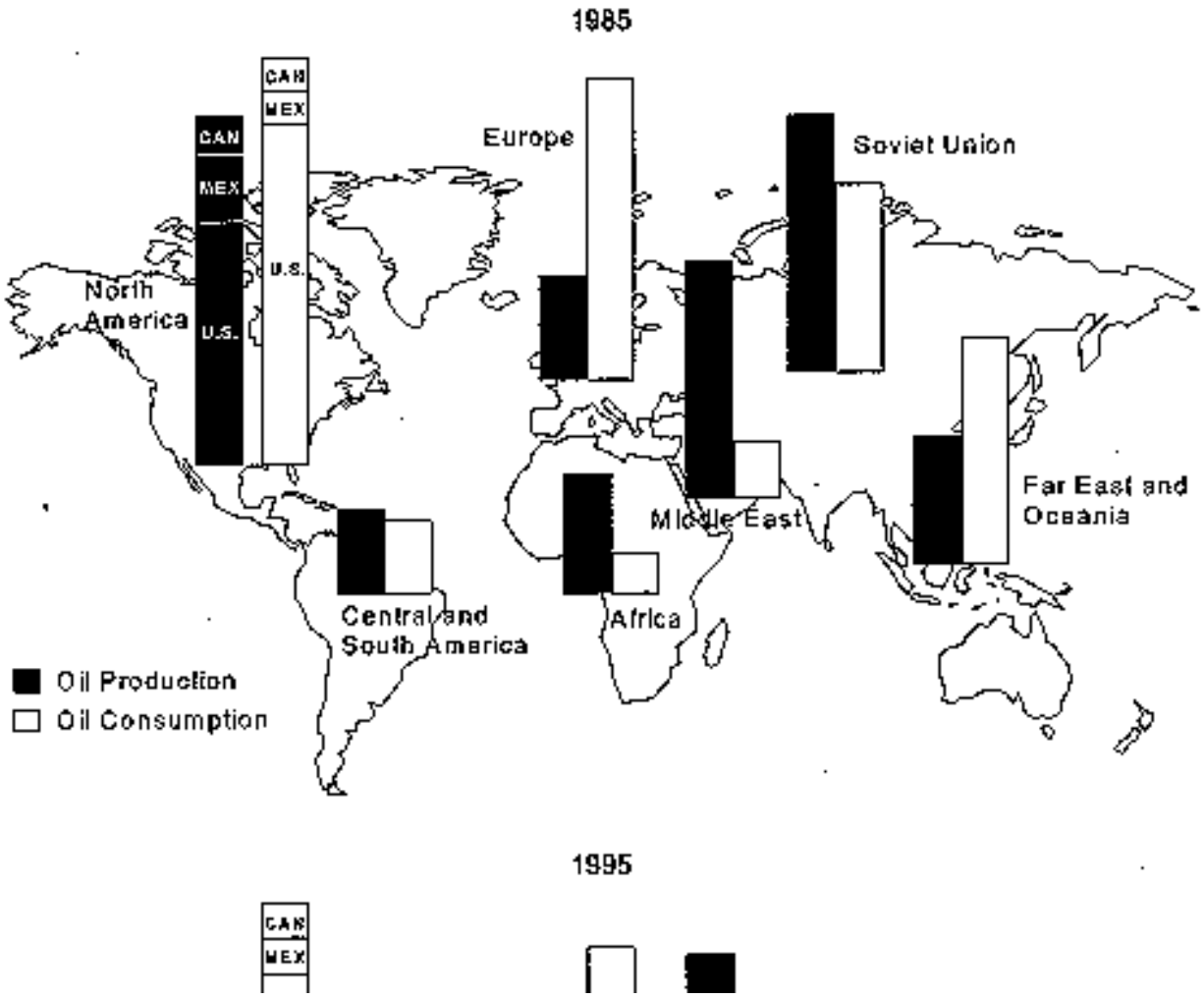
Scientific evidence: According to the U.S. Department of Energy (DOE), domestic oil reserves have declined over the past decade. However, this should not naively be thought to be a sign that the world is rapidly running out of oil. Rather, it means that less oil was being produced by oil companies. The DOE pointed to several economic and industry trends that impacted domestic reserves, such as the sharp decrease in drilling due to the collapse of crude oil prices in 1986, the shift within the petroleum industry to drilling for natural gas, and restrictions on oil exploration in oil-prone places in the United States. (32) Domestic and world oil resources are difficult to quantify in that, in addition to known high-grade resources, there are lower-grade oil reserves which can be tapped using new technologies, as well as oil fields that have yet to be discovered. In 1995, the Department of Interior's estimate for undiscovered recoverable oil plus inferred resources of domestic crude oil was 132 billion barrels, which was six times larger than the 1995 proven reserves. (33) It must also be remembered that the most oil reserves lie outside of the United States.

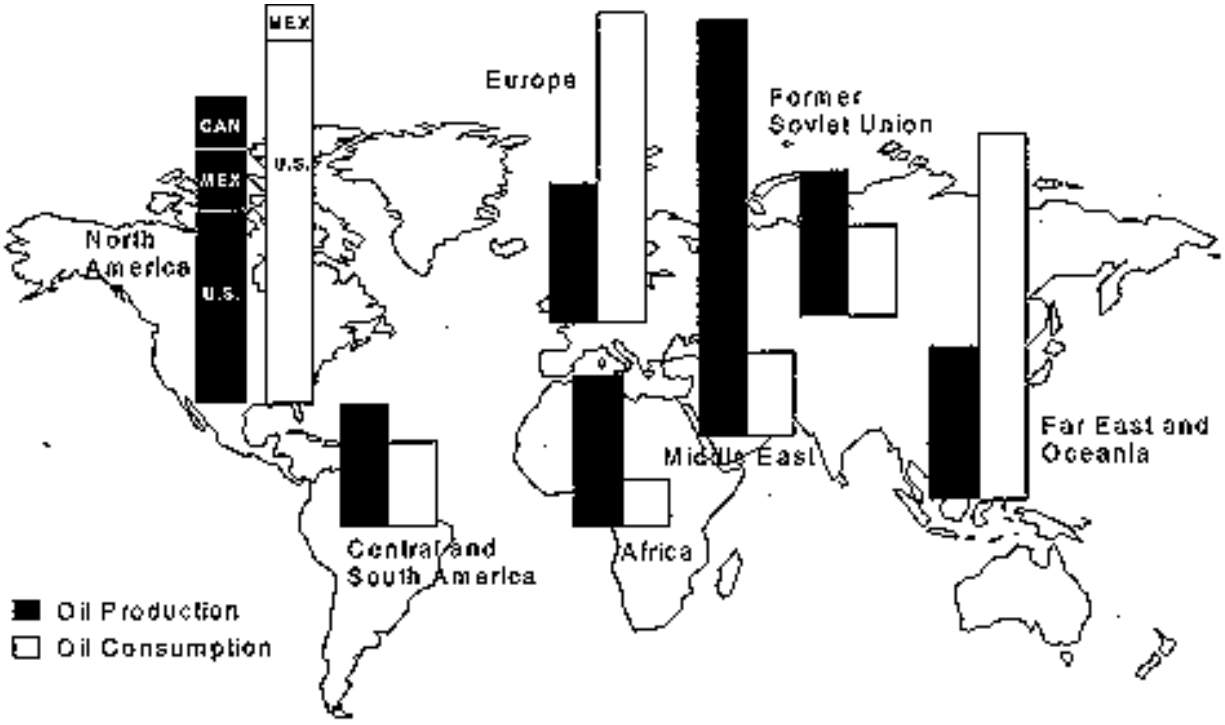
People-as-Problem-Solvers: Predictably, one of the responses of the human creativity/ technological advancement proponents is that technological development will allow for a greater efficiency in the use of minerals resources. However, there is a second dimension to technological development that they point to: technological advancements may also mean less dependence on a given resource. For instance, historically, wood and steam were the primary sources of energy prior to oil. With the advent of the internal combustion engine, petroleum became the primary energy resource. Thus, the development of new technologies caused a shift in the demand for certain resources. In the future, our sources of energy may be nuclear power, solar power or wind power. As Julian Simon, a self-described optimist in these matters, argues,

- > trends in energy costs and scarcity have been downward over the entire period for which we have data. And such trends are usually the most reliable bases for forecasts. From these data we may conclude with considerable confidence that energy will be less costly and more available in the future than in the past. The reason that the cost of energy has declined in the long-run is the fundamental process of (1) increased demand due to growth of population and income, which raises prices and hence constitutes opportunity to entrepreneurs and inventors; (2) the search for new ways of supplying the demand for energy; (3) the eventual discovery of methods which leave us better off than if the original problem had not appeared. (34)

Thus, according to Simon theory based on historical data, either new technologies will develop, thereby lessening the need for more petroleum, or scarcity will eventually arise, thus spurring invention and development of new technologies.

Figure 52. Regional Supply and Demand Balance, 1985 and 1995





Notes: Oil production includes crude oil, natural gas plant liquids, other liquids, and refinery processing gains. Oil consumption includes internal consumption of all refined products, refinery fuel and loss, and bunkering.

Sources: 1985: Energy Information Administration (EIA), *International Energy Annual 1986* (October 1987), pp. 30-31, 1995: EIA, *International Energy Annual 1995* (December 1996), pp. 5-7 and 207-209.

Source: U.S. Department of Energy, Petroleum 1996: Issues and Trends.

Resources At A Glance

- In 1997, 84 countries enjoyed a life expectancy at birth of more than 70 years, up from 55 countries in 1990. The number of developing countries in the group has more than doubled, from 22 to 49. (UNDP 1999 Human Development Report)
- Between 1990 and 1997 the share of the population with access to safe water nearly doubled, from 40% to 72%. (UNDP 1999 Human Development Report)
- Despite rapid population growth, food production per capita increased by nearly 25% during 1990-97. The per capita daily supply of calories rose from less than 2,500 to 2,750, and that of protein from 71 grams to 76. (UNDP 1999 Human Development Report)
- Cropland, which includes land devoted to temporary and permanent crops, temporary meadows, market and kitchen gardens, and land temporarily fallow, consumes 11% of
- The natural resource base upon which humanity depends is constantly shifting: a new oil reserve was found in the Yellow Sea, adding substantially to the size of already-known reserves. (Wall Street Journal, 6 July 1999)
- As of August 11, 1999, the U.S. Census Bureau estimated the world population to be 6,004,955,370. In contrast, the United Nations Fund for Population Activities estimated the world population to be 5,986,627,870, which varies from the U.S. estimate by 18,327,500.
- Decreasing rate of growth: the UN estimates that the world population will be 8.9 billion in 2050; earlier estimates were 9.4 billion by 2035 and 10 billion by 2050. (UN 1998 Revision of the World Population Estimates and Projections)
- Decreasing fertility on a global scale:

the total land area in the world. (World Bank, 1998/99 World Development Report)

- Water: a problem of distribution
    - *Consumption rates:*

      US 600 liters/day per person

      EU 200 liters/ day per person

      Africa 30 liters/day per person

1950. 5 children/woman

1990. 2.9 children/ woman

1996. 2.8 children/ woman

- 1998 2.7 children/ woman

2035. 1.7 or less children/ woman

ENVIRONMENT

Neo-Malthusian Perspective

More and more, neo-Malthusians are characterizing the environment as a resource, treating it as something that is quantifiable and limited in nature. Thus, they plug 'environment-as-a-limited-resource' into the Malthusian equation, which has previously been established—many times over—as flawed. However, there are additional factors that severely compromise the neo-Malthusian argument for a limited environment. One major ground for skepticism is the state of scientific knowledge regarding the environment. In reality, science is still discovering and trying to understand the intricate relationships within the environment, not to mention the complex interconnections between humanity and the environment.

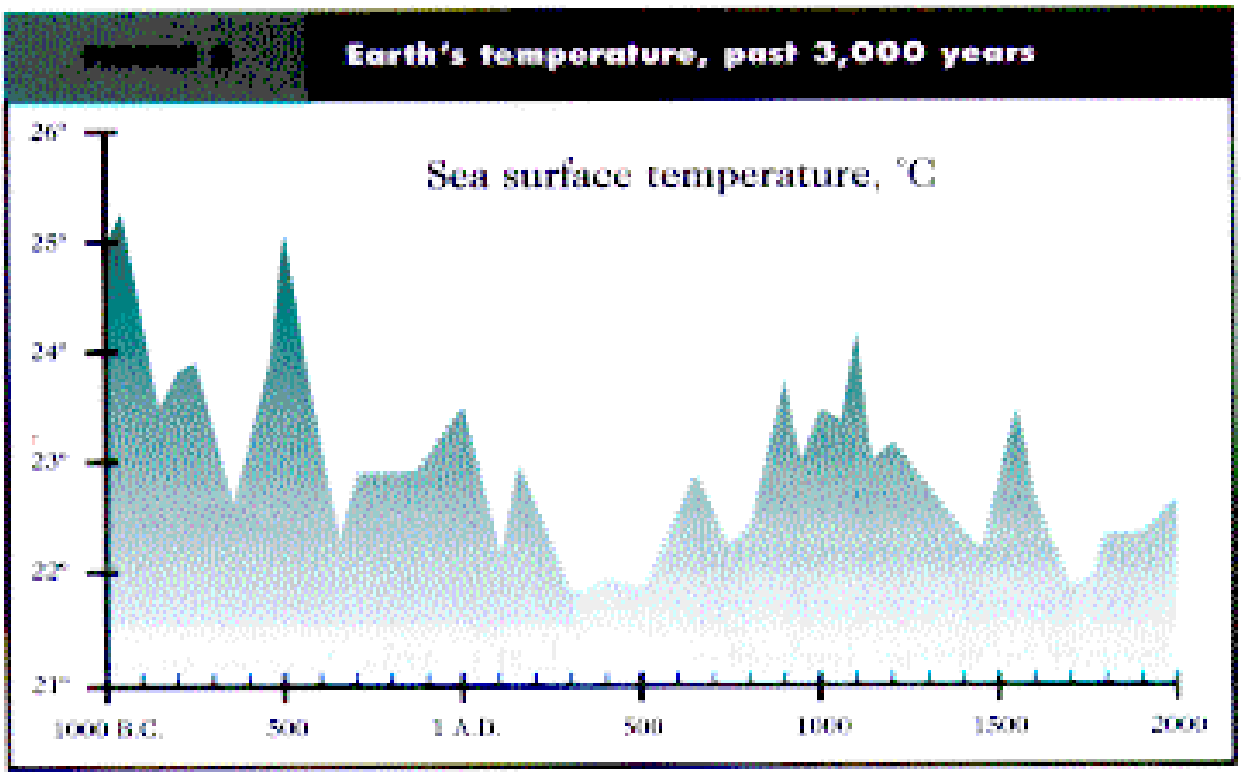
Not only do neo-Malthusians see the environment seen as a fixed entity, but people are perceived to be the greatest threat to the earth and are reduced to the single role of 'polluters'. To posit that there is a direct, unmitigated relationship between population and the environment is a shaky proposition at best, due to the compromised nature of their argument and because so little is actually known about the environment itself.

Global warming

Scientific evidence: Climatology is a relatively new area of study that has grown in importance over the last few years. While historical data has been noted in 'weather diaries' kept by interested amateurs, climatology was not established as a profession until the mid-to-late 1800s, with the first national (US) climatological program established in 1955-56 and National Oceanic and Atmospheric Administration (NOAA) established in the 1970. (35) Climatologists are still striving to gather information so as to understand the basic workings of climatology and weather, such as cloud formations, as well as more complex occurrences such as El Nino and La Nina.

Trying to piece together a history of weather and climate is an interesting project. By collecting bits of information from a variety of sources (diaries recording weather observations, historical accounts regarding the weather, crop failure or abundance, or the spread of disease), climatologists and historians have created an historical picture of climate throughout the ages. This picture is revealing in that it highlights the drastic changes that have taken place in the global climate over time. For instance, between 900 AD and 1300 AD, the earth warmed 4-7 degrees, bringing about what is commonly referred to as the Little Climate Optimum. It is in this period that many regions of the world enjoyed "one of the most favorable periods in human history. Crops were plentiful,

death rates diminished, and trade and industry expanded—while art and architecture flourished."(36)



Source: American Outlook, Spring 1998.

However, this Optimum was ended by a decline in temperatures worldwide, ushering in what has been referred to as the 'Little Ice Age.' (37) Some paleoclimatologists suggest that this period of cooling tapered off in the 1880s, giving way to a gradual increase in temperature worldwide. Scientists do not know what caused the Little Ice Age, nor its predecessor, the Little Climate Optimum, nor are they able to account for the slow rise in temperature over the last one hundred years. Thus, the climate is not a fixed, unchangeable thing, but rather it shifts due to causes that are unknown or are not fully understood by science.

The current rise (one degree Farenheit in this century) in the global temperature has been attributed to a phenomenon called 'greenhouse effect,' or 'global warming,' as it is more popularly called. Many people are quick to erroneously assume that global warming refers only to the effects of anthropogenic activity on the climate. However, the greenhouse effect, by definition, is a natural occurrence which can be impacted by outside influences (i.e.volcanic activity or human activity); no one is certain as to how or to what degree these activities impact this natural phenomenon. So what do we know about the greenhouse effect?

The greenhouse effect occurs when rays emitted by the sun heat the Earth's surface, which then radiates this energy back into space. Portions of this outgoing energy are blocked from returning to space and are 'trapped' in the atmosphere by so-called greenhouse gases. The primary greenhouse gas is water vapor, followed by carbon dioxide, which has about one-seventh the warming potential as water vapor, as well as by gases with far less potential: methane (CH4), nitrogen oxide (N2O), and chloroflorocarbons (CFCs). These gases absorb the infrared radiation emitted from the Earth's surface, and then supposedly heat up the troposphere—the lower atmosphere. While being held in the troposphere, the radiation is then released in all directions; some portions of the energy make it out into space, some back to the earth's surface, and some remains in the atmosphere. This ends the process of the greenhouse effect. The conclusion which flows from this proposition is that any increase in the so-called greenhouse gases necessarily implies an increase in the global temperature. However, despite all of the 'greenhouse emissions' which have been released into the atmosphere since the beginning of industrialization, global warming has not been the inexorable conclusion. One scientist has pointed out that

> As a result of all the infrared absorbing emissions, the effective CO2 concentration is not 357 ppm but 432 ppm. That increase is attributable tot he contribution of additional methane (30 ppm if it were CO2), nitrogen oxides (approximately 10 ppm), CFCs (20 ppm), and other emissions, which, added to 357 ppm, results in a total of 432 ppm, which is 60 percent greater than the concentration was before the emissions that accompanied the industrialization of the planet. And therein lies one of the most intriguing mysteries in science: if greenhouse enhancement invariably leads to an increase in surface temperature, where's the warming? (38)

This mystery has confounded many scientists, who expected global warming to accelerate toward the end of the century. However, the growth rate of the greenhouse effect has decreased about 25 percent since 1980. (39) This highlights the lack of scientific knowledge surrounding little-understood climate processes. Dr. James Hansen, of NASA's Goddard Space Institute says that this shows that " our understanding of…greenhouse gases is not all that good. We really have to understand the cycles of these greenhouse gases if we're going to reliably forecast what's going to happen in the next century." (40) Inaccurate data due to problematic methodology also exacerbate the lack of understanding. Problems such as falling satellites(41), which are supposed to measure atmospheric temperatures, and increased urbanization around weather stations measuring land temperatures lead to inaccurate readings. Until science finds a way to work around such problems in data-collection, it will be difficult to give a precise long-range forecast for global warming.

All of this information is not put forth as if to say that global warming will not occur, but it does place serious caveats on the panicked forecasting made in some circles.

With the Earth Summit in Rio de Janiero in 1992 and with signing of the Kyoto Protocol in 1997, the issue of global warming gained prominence in the public eye. Prior to the Earth Summit, the Intergovernmental Panel on Climate Change (IPCC) released a document intended to aid policymakers craft legislation regarding the climate. The conclusions in the IPCC's document were already challenged by many in the scientific community even before it was presented at the Earth Summit. The IPCC's original predictions called for rise of 5 feet in the sea level by 2030, and a 6 degree rise in temperature by the same year. However, due to the challenges from their colleagues, the IPCC made revisions to their predictions in 1997—1.25 feet or less rise in sea level, 1-3.5 degree rise in temperature by 2030. It seems, though, that given the fall in emissions, especially CO2 (42) and the growing understanding of climate processes, another revision could be likely.

Free-market response: Advocates of a free-market approach do not believe that the correct tactic in dealing with the problem of greenhouse emissions is in increased governmental regulation of the 'command-and-control' sort. Rather, they are pushing for the use of economic incentives to protect the environment in all sectors—whether it be to control greenhouse emissions, deforestion, or water and air pollution. (43) Free-market advocates also point out that 'command-and-control' systems are inefficient and that government control actually promotes greater environmental abuse. (44) They frequently point to the success of early market-based programs which curbed the release of sulfur dioxide into the air, as well as to efforts to control lead emissions following the 1970 Clean Air Act. In the latter example, the EPA gave oil companies two years to meet the allowable emissions standards. Each refinery got a quota of lead, which they could trade with other refineries. In this way, refineries were allowed to meet clean air standards at a pace that was not harmful to them financially. Free-market proponents argue for a similar treatment with greenhouse emissions—that a market-based approach or other incentive approach will actually do more to encourage companies to clean up the environment. "Market-based environmental policies can increase environmental protection and economic productivity by providing incentives for business and individuals to go beyond what regulators can require."(45)

People-as-Problem-Solvers: This position holds that, historically, technological advances mean less pollution of the environment. Had not the invention of an internal combustion engine that runs on lead-free gasoline occurred, then the air quality would be considerably poorer today. "Technologies often go through innumerable improvements over their lifetimes, and they therefore require careful attention by human agents who are alert to the opportunities for such improvement and who have the incentives to develop or adopt them," argues Stanford economist Nathan Rosenberg. "In fact, it is not uncommon for the later improvements to bring about greater advances in efficiency than the original innovation itself." (46) Thus, it will be through technological improvement (in combination with a market system that provides incentives for innovation) that man-made emissions will be reduced and the impact upon natural climate processes diminished.

Land degradation

Land degradation can come about through a variety of processes--deforestation, desertification through poor agricultural techniques, amongst others. According to neo-Malthusians, the increasing number of people will increase land degradation, because more people consume more trees (deforestation) and more food (agriculture). Thus, the solution is to limit the number of people/consumers/polluters.

Scientific evidence: As mentioned earlier, land degradation is thought to be caused by two different sources: deforestation and desertification through poor land management. The FAO's description of the issue begins by noting that

- > Drylands cover about 30 percent of the world's terrestrial surface and are home to 900 million people. Defined as arid, semi-arid and dry sub-humid areas, they are among the world's most fragile ecosystems. Over centuries, their inhabitants - including some of the world's poorest populations - have developed complex food production systems to minimize the threat of recurring droughts and desertification.
>
> Various factors contribute to widespread natural resource degradation in dry areas: climatic variation, inappropriate land use and agricultural practices, increasing population density, economic pressures and changes in land tenure patterns. For example, degradation of tree and shrub formations and overexploitation of forests are among the major causes of soil degradation in the dry tropics. FAO data indicates that the rate of deforestation in these areas is almost one percent a year. (47)

According to the World Bank, the annual amount of deforestation for the world was 101,724 square kilometers in the period 1990-1995. A disaggregation by country reveals that many countries (such as the U.S. and many EU nations) actually had negative rates of deforestation: the U.S. 'deforested' –5,886 square kilometers; the U.K 'deforested' –128 square kilometers; France, -1,608 s. In contrast to those numbers, Indonesia deforested 10,844 square kilometers, Brazil 25,544 square kilometers etc.

With regard to the problem of desertification, the FAO points out that this form of land degradation can be a problem of too much water as of too little water. Waterlogged land can develop salt deposits, rendering the land unusable. However, both are the result of poor management. (48)

People-as-Problem-Solvers: Neo-Malthusians are quick to point out these developing nations are the major culprits of deforestation. It is these lesser developed countries (LDCs), incidentally, that currently possess some of the highest rates of population growth. Rather than helping these nations to attain better levels of development through assisting in the creation of economic and social infrastructures, the neo-Malthusian/ UNFPA-backed solution to combating the evils of underdevelopment, such as deforestation, is to ship them thousands of condoms and to set up government programs for adolescent reproductive health. (49) Thus, rather than treating the problem of deforestation as symptomatic of a larger development ailment, neo-Malthusians look at it as a problem of too many people. As a consequence, people are treated as the only variable that can be manipulated in the equation, since all others are mistakenly assumed to be fixed and unchangeable.

In contrast, 'People-as-Problem-Solvers' proponents think that neo-Malthusian-based policies jump too quickly in placing blame on LDCs for deforestation problems. For instance, such policies fail to take into account the amount deforestation that occurred in now-industrialized nations. It only now, with the benefit of mature economies and infrastructures that developed countries can afford to be concerned about deforestation. To the developed nations' credit, they are implementing reforestation programmes; however, to their discredit, environmentalists from first world nations would like to implement these same reforestation programmes in countries with underdeveloped economies and infrastructures. This debate once again highlights the disparity between first-world and third-world nations in terms of development, wealth, and consumption.

Advocates of a 'People-as-Problem-Solvers' approach see many possibilities for resolving the problem of land degradation due to deforestation. Many believe that current problems are the result of poor management on the part of governments. A case in point is the 1990s experience of the town of Quincy, California. The tension between economic survival and environmentalism had

divided the small town into openly warring factions. It was not until the townspeople came together to work out a compromise that progress was made for both sides—the local logging industry and environmental concerns groups. Eventually their proposal was adopted, in modified form, by the US Congress as sustainable development scheme for management of the national forests. (50)

This sort of grassroots solution is supportive of the 'People-as-Problem-Solvers' perspective, but it also lends much to those of the free-market persuasion, since it advocates a deregulated, win-win option that protects the environment without stunting the growth of the local economy. This approach also takes into account the knowledge, wisdom, abilities, and needs of the local population, in contrast to more centrally-planned approaches.

Air & Water Pollution

It is a tenet of the neo-Malthusian position that population growth inexorably leads to the destruction of the environment; they say it is only a matter of time before the earth's carrying capacity will collapse under the pressure of people. One of the ways that humanity is 'biting the hand that feeds it' is through pollution of the air and water.

Scientific evidence: According to a recent report by the Department of Energy, CO2 emissions fell slightly in the last year, despite a rapidly expanding economy. (51) The numbers are interesting in that while they demonstrate a decline in emissions, they also point out which nations are the largest consumers of energy and the biggest polluters.

Carbon Trends by Country

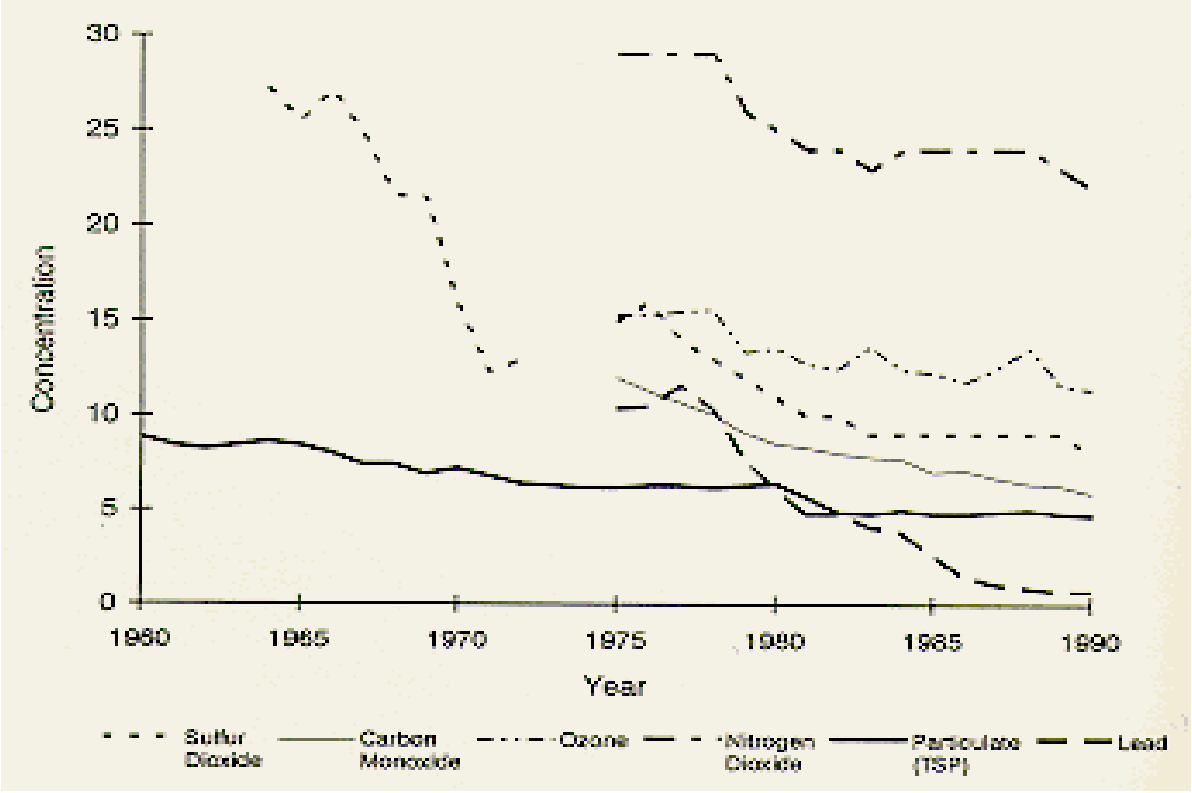
Country	1998 Carbon Emissions (million metric tons)	1998 Carbon Intensity (tons/mill $ GDP)	Change in Emissions since 1997 (percent)	Change in Emissions since 1990 (percent)
U. S.	1,460	181	+0.4	+10.3
China	803	194	-3.7	+28.0
E.U.	548	106	-0.9	+0.7*
Russia	400	652	-1.3	-23.9**
Japan	297	101	-2.5	+5.6
India	276	162	+1.8	+55.2
WORLD	**6,318**	**153**	**-0.5**	**+6.3**

*Change from 1991; **Change from 1992.

Source: Worldwatch Institute, 1999

On the whole, industries have been fairly successful in curbing pollution emissions. A 1992 report released by the Council on Environmental Quality showed that emissions of pollutants such as sulfur dioxide, carbon monoxide, lead, and other particulates have dropped off dramatically over time, especially since the 1970 Clean Air Act.

Pollutants in the Air, U.S., 1960-1990



Source: Council on Environmental Quality, 1992

With regard to water pollution, this year's statistics from the United Nations Development Programme and from the World Bank speak volumes about the effort to clean up the world's water supply. As mentioned earlier, the UNDP's *1999 Human Development Report* stated that "between 1990-1997 the share of the population with access to safe water nearly doubled, from 40% to 76%." (52) Another measure of success or failure with regard to curbing water pollution, as well as air pollution, are mortality rates. The *1999 Human Development Report* has also shown that by 1997, "84 countries enjoyed a life expectancy at birth of more than 70 years, up from 55 countries in 1990. The number of developing countries in this group has more than doubled, from 22 to 49." (53) It is significant that these sorts of gains are also being made in developing nations, which are usually assumed to have made no gains on any environmental front.

Naturally, this sort of information is supportive of the arguments made by advocates of the 'People-as-Problem-Solvers' perspective. This sector believes the triumphs over pollution are attributable to advancements in technology and in human ingenuity and innovations. Development in technologies enabled greater environmental protection measures to take place.

Environment At a Glance

- Climatology is a new and emerging science that is still developing in its understanding of climate dynamics.

(NASA's Dr. James Hansen)

- The IPCC has revised its initial findings on the effects of global warming for the year 2030.
- *Rise in sea level*

  1992 5 ft.

  1997 1.25 or less feet

  Rise in temperature

  1992 6 degrees

1996. 1-3.5 degrees

- Between 1990 and 1997 the share of heavily polluting traditional fuels in the energy used was reduced by more than two-fifths. (UNDP 1999 Human Development Report)

- Pollution decreasing:
- *Change in CO2 emissions from 1997*

  (Worldwatch Institute)

  - U.S. +0.4%

    China -3.7

    E.U. -0.9

    India +1.8

    World -0.5

- Disparity in development: the issue of deforestation.
- *Square km annually, 1990-95 (World Bank 1998/99 Development Report)*
  - US -5,886

    France -1,608

    Indonesia 10,844

    Brazil 25,544

CONCLUSIONS

The population-resources-environment question is a complex debate that has thousands of pages documenting the arguments from all sides. This survey has attempted to offer an overview of the major players in the current debate, as well as a working knowledge of the logic underlying their arguments. As research for this survey was conducted, it became apparent that the neo-Malthusian perspective has become the most popularized and widespread vision of the population-resources-environment debate, especially in media and policymaking circles. Thus, this survey is an attempt to critique the status quo, as it were, and to question the arguments and their underlying assumptions which have been so readily accepted by so many. It has been shown that the neo-Malthusian perspective is seriously flawed on many levels and that policy actions based on such assumptions will be equally compromised and potentially damaging. It has also been shown that there are many and varied critiques of this popular vision of the population-resources-environment debate. Most potent amongst these critiques for the rational observer is the scientific data, which holds neo-Malthusian claims up to the light of reality. Let the data speak for itself.