

# How Many People Can The Earth Support?

## The Carrying Capacity Debate

*Agreeing to disagree*

The Larger Questions *How many, how much, how long*

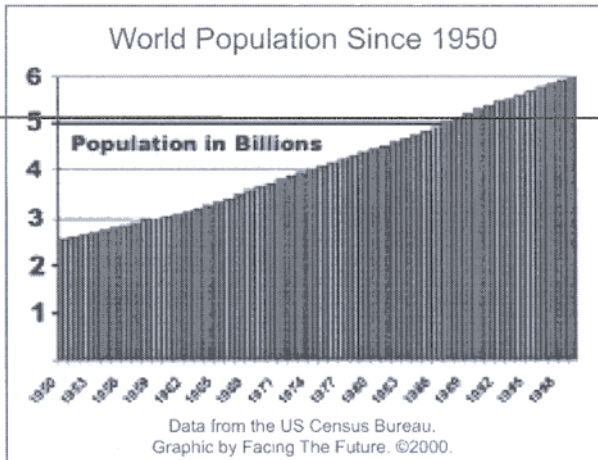
The Lifestyle Lottery *Which would you choose?*

## How Many People Can the Earth Support?

The dramatic increase in human numbers during this century has been cited by some as proof that the Earth is overpopulated. But the diversity of natural environments and human lifestyles around the world makes any definition of overpopulation highly subjective. What seems overcrowded in suburban America might be considered comfortable or even lonely in urban India, for example.

In seeking a better way to determine sustainable levels of population and development, some scientists have begun to look at the Earth's "carrying capacity." This is generally defined as the number of individuals the planet can support indefinitely. The problem with this, however, is that there is a lack of scientific data, and therefore no consensus as to how many people the Earth can support. (In 1994, estimates of sustainable population ranged from less than 3 billion to over 44 billion.)

Some individuals - mainly biologists and environmentalists - argue that human numbers have already exceeded the Earth's carrying capacity. They point to the growing rate of extinction of species, global climate change, and more people living in poverty than ever before as indicators of this. Others - mainly economists - argue that the planet can sustain an almost infinite number of human beings. More people provide more brains to figure out how to increase carrying capacity, they contend, and cite such things as the "green revolution," increased energy efficiency, and increasing longevity to support that argument.



## The Carrying Capacity Debate

The "pro growth" or "free trade" faction, typified by the late economist and author Julian Simon of the University of Maryland -essentially believes that natural resources are not finite in an economic sense. Any scarcity is temporary, they argue, until price increases spur efforts to discover new sources of raw materials, and new technologies to extract and process them.

In fact, Simon contended, consumption of resources is actually beneficial because it stimulates their production. Rather than trying to stabilize population or lower consumption, he said, we should focus on economic development, production, and consumption. Simon cited increased life expectancies, global economic growth, and lower price trends for energy as indicators of success.

The "sustainable" faction -represented by environmentalists such as Lester Brown, president of Worldwatch Institute. argues that many essential stocks of renewable resources are already in decline, and that technology alone cannot reverse these declines.

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Brown points out that in many parts of the world, forests, aquifers, pasture lands, and fisheries are being utilized faster than they can be replenished. Despite the Green Revolution, he notes, world grain carryover stocks, and therefore global food security, remain near record low levels. And despite half a century of unprecedented economic growth, nearly one quarter of the world's people live in extreme poverty.

### **Carrying Capacity and Sustainability**

Carrying capacity is defined as the maximum population a given ecosystem (or planet) can support without jeopardizing its ability to support future generations. Sustainability, or sustainable development, essentially means that economic systems should meet the needs of existing populations without endangering or stealing from future generations. It means that consumption must be balanced with the rate at which the ecosystem can renew resources. And it means that disposal of wastes must be balanced with the ability of natural systems to absorb or neutralize them. The carrying capacity of any given ecosystem is dependent upon:

- .the size of the population within the system**
- .the per capita economic activity and resource consumption of that population**
- .the technology used to support that activity and consumption**
- . and the amount and type of wastes generated**
- .the depth and breadth of the resource base**
- .and the susceptibility of the ecosystem to damage**

It is possible to exceed carrying capacity through overpopulation, over consumption, or the utilization of destructive or inappropriate technologies. Any combination of these variables can also exceed the carrying capacity of a given system. Thresholds of damage will be lower in fragile ecosystems (meaning carrying capacity is more quickly exceeded because the environment is easily damaged), while more robust ecosystems may withstand higher levels of population and consumption.

The consequences of any species exceeding the carrying capacity of its environment is a "die off," until the population is brought back within sustainable limits. Because the cumulative damage inflicted by overpopulation, over consumption, or destructive technologies also reduces carrying capacity, the die off is likely to be catastrophic.

Both sides in the debate agree on many of the underlying facts. Since 1950, the world's population has more than doubled, and its economic output has increased almost six fold. In that time, world water use, and demands for grain, firewood, beef and mutton have tripled, and fossil fuel use has nearly quadrupled. But they disagree on the impacts and benefits of those trends.

Simon, in his books *The Ultimate Resource* and *The Ultimate Resource 2*, pointed out that per capita energy costs have fallen in the last half of this century due to demand driving production. He argued that resources are not truly in decline, and cited as evidence relatively modest increases or even significant decreases in commodity prices.

Simon also argued that concerns about rapid rates of species extinction are vastly overstated, and that global warming and ozone depletion are less threatening than many perceive them to be. Population growth is positive, he believed, because more people means more human intelligence can be focused on solving problems.

But Brown charges that low energy costs do not include "externalities" such as the loss of salmon runs due to hydroelectric dams, spills from oil tankers, or acid rain from coal and oil-fired power plants. He also notes that many commodity prices are kept artificially low by government subsidies for large energy, forestry, mining, and agribusiness interests. Brown wrote in the Worldwatch publication, *State of the World 1998*, "While economic indicators such as investment, production and trade are consistently positive, the key environmental indicators are increasingly negative. Forests are shrinking, water tables are falling, soils are eroding, wetlands are disappearing, fisheries are collapsing, rangelands are deteriorating. rivers are running dry, temperatures are rising, coral reefs are dying, and plant and animal species are disappearing. The global economy as now structured cannot continue to expand much longer if the ecosystem on which it depends continues to deteriorate at the current rate."

### **The Larger Questions**

What's missing in this debate is any agreement about the specifics of the question. Before we can determine how many people the Earth can support, we have to answer the question, "What do we mean by support?" Does it simply mean the ability to feed, clothe and house people? If so, we must also ask, "at what standard of living? For what percentage of the population? And for how long?"

For example, could the current global population of nearly six billion all live an American lifestyle indefinitely? If we consider that with under five percent of the Earth's population, Americans use roughly one quarter of all energy and

fossil fuels, one third of all paper, one fifth of all metals, and generate almost three quarters of toxic waste worldwide, the answer seems clearly to be no.

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If the Earth cannot support its current population at a typical American standard of living, then two basic possibilities emerge. One is that everyone could live a less intensive lifestyle -eating less animal protein, consuming less energy, living in smaller homes, and having fewer consumer goods. The other is continued inequity between rich and poor nations and individuals, with a few living high-impact lifestyles, and most people living a minimal existence.

Either possibility has severe economic, social, and security implications. Either possibility would also have to include the reality of several billion more people on Earth in the next 50 years.

### **What lifestyle Would We Choose?**

If carrying capacity is defined as the maximum population the Earth can sustain without reducing its ability to support that population in the future, further questions arise. Is physical support enough for human beings, or do we also need social and spiritual support? Is there a difference between "biophysical" carrying capacity and "social" carrying capacity?

It is theoretically possible for people to survive in a world that consists of only water, shelter, and grains. But would we want to? Could we live in the "virtual" world forecast by some "futuralists," in which people barricade themselves inside against the outside threats of crime and pollution? Or do we need access to real parks and playgrounds, real wildlife and wilderness, and silence and solitude in nature?

If population continues to grow unchecked, there is also the question of how long our social structures will survive. Scientists have long recognized that crowding itself is stressful. Depending upon social and cultural contexts, manifestations of that stress include increased levels of crime, communal violence, drug abuse, civil unrest, and war.

We also need to ask how many people can the Earth support with what kind of political instructions? Democracies may not deal with resource scarcity and conflicts as effectively as authoritarian regimes. There is already a trend away from democracy, and toward "hard" regimes in many areas where population growth, poverty, resource scarcity, and environmental degradation threaten social stability. In some parts of Africa, Asia, Latin America, and the former Soviet Union, authoritarian regimes have come to power (or existing regimes have become more authoritarian) as a response to these destabilizing influences. If democracy is our preferred form of government, the social carrying capacity of the planet may be lower than it would be under dictatorships.

As the world becomes more crowded, the question of how we will respond to these increasing stresses becomes much more critical. Despite the end of the Cold War, some 30 wars and dozens of deadly local conflicts currently rage around the planet. As more people compete for diminishing resources as environmental destruction exacerbates those scarcities -security experts foresee the potential for greater conflict.

This may generate a devastating cycle in which more and more resources and technology are committed to preparing for and engaging in conflict, and fewer resources are available to support the needs of the population. The resulting increase in stress and scarcity then promote even greater instability and conflict.

In short, the answer to the carrying capacity debate is dependent upon the choices we make about our personal reproduction, our lifestyles and consumption, and our political, economic, and social priorities. As Paul and Anne Ehrlich noted in *The Stork and The Plow*, "Earth can support a larger population of cooperative, far-sighted, vegetarian pacifist saints than of competitive, myopic, meat-eating, war making typical human beings. All else being equal, Earth can hold more people if they have relatively equal access to the requisites of a decent life than if the few are able to monopolize resources and the many must do without. The problems of population, social and economic inequality, and environmental deterioration are thus completely intertwined."

### Refining the Question

How many people can the Earth support:

- At what average level of well-being?
- With what distribution of material well-being?
- With what technology?
- With what kinds of domestic and international political institutions?
- With what domestic and international economic arrangements?
- With what domestic and international demographic arrangements?
- With what physical, chemical and biological environments?
- With what risk or robustness?
- For how long?
- With what values, tastes, and fashions?

*From the article "How Many People Can the Earth Support?" in the January 1996 "Population Today," by Joel Cohen*

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