The Population Delusion

25 September 2009 by Alison George NEW SCIENTIST issue 2727.

INTRODUCTION

THINK of the biggest crowd you've ever been in - perhaps 50,000 in a sports stadium. Just 6 hours from now there will be that many more people in the world, and another 50,000 in the following 6 hours, and on and on... No wonder that the burgeoning human population is often seen as is the single biggest problem facing our world. There are nearly 7 billion humans alive today, twice as many as there were in 1965, with 75 million more being added each year. UN predictions say there could be an extra 2 to 4 billion of us by 2050. The planet has never experienced anything like it.

Can the world sustain this growing horde? It's a contentious question. While it is clear that the population cannot go on increasing forever, history is littered with dire but failed predictions of famine and death resulting from over-population. Most famously, Thomas Malthus warned more than two centuries ago that population would be held in check by rising mortality. What he failed to anticipate was the ability of newly industrialised societies to support large numbers of people.

Today, the "population problem" is firmly back on the agenda. Earlier this year the UK government's chief scientific adviser John Beddington predicted a population-led global crisis by 2030, and a group of influential billionaires including Bill Gates and George Soros identified overpopulation as the greatest threat facing humanity. Every time we publish an article in New Scientist detailing yet another of the planet's environmental woes, readers respond by arguing that the real problem is overpopulation. The population statistics are indeed staggering. Yet the raw numbers hide a multitude of complexities. Look closely, and it becomes clear that the common-sense assumption that population is the root of all evil is simplistic.

For example, while the human population is growing in absolute terms, the rate of growth is slowing - from a peak of 2 per cent in the early 1960s to around 1 per cent today. In Japan, Russia and many European countries, women are having so few children that populations are shrinking or will do so soon - an unprecedented state of affairs other than in times of war or plague (see "Days when the world has shrunk"). At the same time, the populations of many of the least developed nations are exploding, with women in some countries giving birth to more than five children on average.

In the articles that follow, we unpick some of these complexities. Paul Ehrlich, who reignited debate a generation ago with his best-seller The Population Bomb, is sticking to his assertion that we need to act to rein in fertility ("Paul Ehrlich: Population, development and the poor"). Conversely, Fred Pearce insists on page 40 that focusing on population is a dangerous distraction from the real issue: consumption. Then there's the brave new world of population shrinkage that Europe is entering, as demographer Reiner Klingholz explains on page 41. Lastly, perhaps human ingenuity will solve the problem. Techno-optimist Jesse Ausubel certainly thinks so, and in our interview on page 38 he explains why.

"We are burdensome to the world, the resources are scarcely adequate for us... already nature does not sustain us." So wrote Tertullian, an early Christian, back in the 3rd century. At that time, the world population stood at some 200 million. Eighteen centuries on and with 34 times as many people on the planet, the debate continues.

Days when the world has shrunk (FYI this was a "Box" in the original article)

The inexorable rise of the human population has been the dominant theme of our planet for centuries. In recent history, days that we know to have ended with fewer people than they started with are extremely rare. The most recent was 26 December 2004, when the Indian Ocean tsunami killed nearly 250,000 people. Another 160,000 died that day of other causes, and the day's 370,000 births couldn't compensate, according to environmentalist Robert Engelman in his book More.

You have to go back to the 1970s to find other days of world population shrinkage, such as the Tangshan earthquake in China on 28 July 1976 and the devastating cyclone that hit Bangladesh on 12 November 1970, both of which killed at least 250,000 people. Even China's great famine of 1958 to 1961, which caused around 15 million deaths, dented rather than stalled world population growth. Further back in time, the 70,000 deaths caused by the atomic bomb dropped on Hiroshima, Japan, on 6 August 1945 outweighed the population growth of around 60,000 people that would otherwise have taken place that day. With a lower death toll, the same probably isn't true of the bombing of Nagasaki three days later. Even a particularly bad day during the first world war, such as 1 July 1916 when the British alone lost around 20,000 men at the battle of the Somme, probably didn't stall the world's upward population trend. However, the flu pandemic of 1918 to 1920, which killed about 50 million people, almost certainly did. The biggest hit to world population in (relatively) recent times is the Black Death of the 14th century, which killed perhaps 75 million people and reduced Europe's population by 30 per cent.

Things will be very different in the future. There will still be disasters and wars, of course, but some time after 2050 the world will enter a new era when the population will shrink on many days. We will simply be having fewer children.

COMMENT #1 Population: Enough of us now

by Paul Ehrlich and Anne Ehrlich

GLOBAL population growth has slowed significantly, but it hasn't stopped. By 2050 there may be about 35 per cent more people on Earth than there are today. We are already seeing increasing shortages of food, water and other resources and growing numbers of hungry people.

Yet to embark on any discussion about limiting our numbers is to enter sensitive and controversial territory. Perhaps this is not surprising, as in the 1960s, when population growth became an issue of widespread concern, the discussions often had a racist undertone, in which the "well-off" focused on the exploding populations of "underdeveloped nations".

Nowadays it is understood that the key population-related issue is the destructive pressure human activity is exerting on our life-support systems, posing a growing threat to the sustainability of civilisation. Of course, this is not all because of human numbers; it also has to do with how much each of us consumes. That's why, in our view, the US with its population of over 300 million and high per capita consumption should be seen as Earth's most overpopulated nation. It is also why the emergence of "new consumers" constitutes a major additional assault on global life-support systems. Moreover, the 2.3 billion people likely to be added to the human population by 2050 will undermine those systems much more seriously than did the previous 2.3 billion, as each additional person will, on average, have to be supported by scarcer, lower-quality resources imposing ever greater environmental costs.

Yet many people still assume that humanity will easily manage to support more than 9 billion people in 2050 and beyond. Such confidence ignores some grim possibilities. There are only two ways by which population can stop increasing: a falling birth rate or rising death rates. We have already seen a rise in death rates in southern Africa and Russia, and there may well be further increases in death rate ahead, especially as disruption to the global climate increasingly destabilises agricultural systems. Even today, more than a billion people are going hungry.

The environmental deterioration resulting from ever more people consuming ever more resources will place the heaviest burdens on those least able to cope, as the great majority of those additional billions of people will be in the poorest nations, where poverty and high birth rates are inextricably linked. Uganda's population, for example, is predicted to almost treble by 2050, growing from around 33 million today to 91 million in the next 40 years. Rapid population growth undermines development efforts. The resulting poor education, lack of public health facilities, and inadequate infrastructure in turn foster high birth rates.

Yet the priority given to population issues has diminished compared with concerns about development. If population growth continues unabated, we fear the problems of development will be "solved" by rises in death rates. For this reason, efforts to slow population growth should be treated as a human rights issue.

The way to reduce fertility rates is well known. It involves a cultural shift towards improving the education and status of women, making family planning and safe abortion more widely available, and moving towards a world where every child is a wanted child.

Nearly all developing countries have family planning programmes, but they are badly in need of renewed support. There has to be a recognition, at the highest political level, of the importance of reducing birth rates both as a pressing human rights issue and as a proven contributor to successful development.

This has to be linked to family health and welfare programmes, to education (especially for girls) and to the opening up of opportunities for women to participate in their nations' economies. An example of what can be achieved is provided by the Grameen bank, which offers credit to the poor people of Bangladesh, especially women, and has no doubt helped reduce birth rates there simply by boosting grassroots economic development.

Somehow, cultural attitudes toward large families everywhere need to be changed. It should be considered immoral to have excessive numbers of children - an attitude that already exists in most industrialised nations with low birth rates. Nothing is more clearly a governmental responsibility than keeping a nation's population size sustainable by benevolent measures.

As well as curbing population growth, we shouldn't forget the pressing issue of excessive consumption by the rich. Humanity needs to get behind a global discussion of these issues, perhaps through a framework we have devised called the Millennium Assessment of Human Behavior (http://mahb.stanford.edu). This is a forum for global discussion of key ethical and cultural issues related to the human predicament. A major element of that discussion must be how to end the growth of the total human population humanely and begin a slow decline similar to the one that has so fortunately started in Europe and Japan. If that can be done, then a sustainable future for civilisation might be possible.

Paul Ehrlich is an ecologist and evolutionary biologist who became a best-selling author with his 1968 book The Population Bomb. He is now professor of population studies at Stanford University, California. Anne Ehrlich has co-authored several books with Paul, and is a director at the Center for Conservation Biology at Stanford

COMMENT #2 Population: Technology will save us

Throughout history, technological innovation has saved us from being overwhelmed by overpopulation, and Jesse Ausubel tells Alison George why he is convinced that human resourcefulness can pull the fat out of the fire even now.

You're known as a techno-optimist. Why have you got such faith in technology's power to save the environment?
I regard myself as neither an optimist nor a pessimist. But I do think that humanity is ingenious and enterprising. Throughout the ages people have doubted that their descendants could exist, with improving health and longevity, in the numbers and densities we do now. In the 19th century it was common to reason that horse manure or chimney smoke would bury or choke cities. Yet air quality in New York City and water quality in New York harbour are better than when I or my mother was a child. Over time people find, invent and spread solutions for many environmental problems.

So do environmental doomsayers fail to factor in our technical ingenuity?
Malthus certainly underestimated technical change. And numerous people considered experts in the 1950s, 1960s and 1970s thought that humanity would not make it to 2009 without big collapses in population, at least regionally. It didn't happen. As a student in the early 1970s, I shared the tremendous interest in Garrett Hardin's 1968 Science article "The tragedy of the commons", which described how herdsmen selfishly add cows to the common pasture until the resource fails for all. In the tragic instances, individual rationality does destroy the collectivity.

Surely our inability to limit ourselves is a major issue.
Some recent research suggests organisms do try to sense limits. Even bacteria turn out to have networks of social communication and to use something called quorum sensing to coordinate their gene expression according to the local density of their population, and so avoid disastrous growth. Viewing normal biological behaviour only as the selfish myopia of the tragedy of the commons contrasts with our emerging understanding of quorum sensing factors, a growing appreciation of altruism and other discoveries in biology and behaviour.

You could say that fear-inducing articles like Hardin's are social equivalents of quorum sensing factors, and we have responded to the signals. Farmers have lifted yields to produce more crops without using more land. Engineers have improved the efficiency of power turbines so that the primary energy needed to serve today's population is much less than if we were still using the engines of Malthus's era or those of 1968. In general, humans are involved in "resource sparing" - the increasingly efficient use of land, energy, water and other materials that allows humanity to grow in numbers, lifespan or level of consumption while stopping the burden on nature from becoming too disastrous.

Won't there come a point, though, when we can't sustain any more people?
No convincing answer exists to the question of how many people Earth can support. Environmental impact derives from a combination of population, affluence, preferences in consumption, and the technology used to produce goods and services. Population and affluence may multiply environmental impact, but changes in technology, consumer preferences and other behaviour can more than offset the multipliers. A look back over 50 years shows success stories, such as urban air quality and the regrowth of temperate forests, as well as cases where the result has been more damaging. The democratisation of sushi is an example of a negative case, as an increase in the number of affluent people with a taste for seafood has been disastrous for bluefin tuna.

Are there any specific changes that would help the Earth support such large populations?
Reading e-books and articles online is already driving newspapers and magazines to stop printing hard copies, thus sparing lots of forest that would have been turned into paper. Light-emitting diodes illuminate far more efficiently than traditional incandescent light bulbs. Viagra spares tiger bone and rhino horn. A vegetarian diet requires about half as much acreage as a meaty one. If people vastly reduced their consumption of meat, humanity would spare a lot of land for nature.

You've said that we could feed 10 billion people on half the area we currently use by improving agricultural efficiency. How would that work?
High yields are the best friend of nature. Even if humans remain carnivorous, if we continue lifting yields at roughly 2 per cent per year, as farmers have achieved over the past 100 years, then simple arithmetic shows lots of land now farmed will be abandoned and can return to nature. The world population is increasing by only around 1 per cent per year, so sustaining 2 per cent yield growth could free half of farmed land over 75 years or so. The highest yields that have been achieved in China, India, the US and many other countries are typically 300 per cent of average yields, so 2 per cent yearly gains are not miracles. They are business-as-usual, but with a lot of sweat.

Do you really think it is feasible that the Earth can support 20 billion people?
Yes. And many qualities of the environment could rise. With my colleagues I have laid out some of the technology and behaviour that would allow large populations to prosper while harmful emissions plummet and large amounts of land and sea are freed for nature. The technologies include 5-gigawatt zero-emission electric power plants burning natural gas, and magnetically levitated trains running in evacuated tubes underground.

Forest area and volume are key indicators of environmental quality. In the 1970s, prospects for forests seemed bleak. Yet since about 1990 in many areas of the world, even in the Congo basin, forests are regrowing. Human respect for the oceans, however, lags a century or so behind our appreciation of the terrestrial environment. Clean aquaculture of herbivores and fooling carnivorous fish into eating tofu in neatly enclosed farms matters a lot, unless we resist the temptation to enjoy seafood.

Your bottom line, then, is that technological advances can alleviate the environmental downsides of increased population. Technology has liberated humans from the environment. Today we live about equally well in polar and tropical, arid and wet environments. The new question is whether humanity can use technology to liberate the environment itself. E-books, landless agriculture - farming that uses very little land because of high yields - and subterranean maglevs show the way.

Environmental scientist Jesse Ausubel is director of the Program for the Human Environment and senior research associate at The Rockefeller University, New York City. He was one of the main organisers of the first UN World Climate Conference in 1979, which substantially raised scientific and political awareness of global warming

COMMENT #3 Population: Overconsumption is the real problem

Fred Pearce

THERE is a pervading myth that efforts to fight climate change and other environmental perils will be to no avail unless we "do something" about population growth. Even seasoned analysts talk about the threat of "exponential" population growth. But there is no exponential growth. In most of the world fertility rates are falling fast, and the countries where population growth continues are those that contribute least to our planetary predicament.

Back in the late 1960s, when Paul Ehrlich wrote his seminal book The Population Bomb, rapid population growth was arguably the number 1 threat to the planet's future. Many believed that only strict birth control could prevent doomsday. But after scandals about forced vasectomies in India and China's draconian one-child policy, such views fell into disrepute. What's more, Ehrlich's prediction of hundreds of millions of deaths from famine in the 1980s fortunately failed to be borne out.

Now the demographic monster has become a hot topic again. Yet the arguments still don't fit the reality. The population "bomb" is fast being defused. Women across the poor world are having dramatically fewer babies than their mothers did - mostly out of choice, not compulsion. Half a century ago, the worldwide average for the number of children a woman had was between five and six. Now she has 2.6. In the face of such a fall it is hard to see what more "doing something" about global population might achieve.

Half the world now has a fertility rate below the replacement level, which, allowing for girls who don't make it to adulthood, is around 2.3. This includes most of Europe, east Asia, North America and the Caribbean. There are holdouts in a few Muslim countries - but not Iran, where fertility is 1.7 - and many parts of Africa. But rich or poor, socialist or capitalist, Muslim or Catholic, secular or devout, with tough government birth control policies or none, most countries tell the same story.

This hasn't yet stopped the world's population from rising. It stands at 6.8 billion, and is growing by 75 million a year. This is mostly because the huge numbers of young women born during the 20th-century's worldwide baby boom are still fertile: they may typically only have two children each, but that is still a lot of babies. Soon, however, if fertility rates continue to decline, each generation of women will be smaller than the last.

Of course fertility rates may not continue to decline, but to date the evidence of countries that have got down to the replacement level is that they don't stick there, they carry on declining. The reasons for this may have a lot to do with the changing position of women in society. Where men take a greater role in bringing up children, and the state intervenes to help working mothers, fertility rates stay quite close to replacement. Where they do not, then super-low fertility may follow; women, in effect, go on childbirth strike.

Even if the world population does stabilise soon and starts to glide downwards, that won't solve the world's environmental problems. The real issue is not overpopulation but overconsumption - mostly in rich countries that have long since given up adding substantial numbers to their population.

Take one measure: carbon dioxide emissions. Stephen Pacala, director of the Princeton Environmental Institute, calculates that the world's richest half billion people - that's about 7 per cent of the global population - are responsible for 50 per cent of the world's emissions. Meanwhile, the poorest 50 per cent are responsible for just 7 per cent of emissions. One American or European is more often than not responsible for more emissions than an entire village of Africans.

Every time those of us in the rich world talk about too many babies in Africa or India, we are denying our own culpability. It is the world's consumption patterns we need to fix, not its reproductive habits.

Fred Pearce's book Peoplequake will be published in February 2010 by Eden Project Books

COMMENT #4 Population: Europe's problems will grow as it shrinks

Reiner Klingholz

EUROPE, where the so-called population explosion got under way in the 18th century, is once again playing a pioneering role in demographic development. The continent has the lowest fertility rate and the most elderly population in the world, and this population will soon start to shrink. All this makes it a front runner in a demographic trend that sooner or later will reach most of the world.

Pioneers have to advance through difficult terrain. Economists are already fretting over the problem of how social security systems will cope when the post-war baby boomers start collecting their pensions in 2015. In hyper-ageing countries like Italy and Germany, where 1 in 7 people will be over 80 in 2050, it is unclear how a shrinking group of young people can generate the wealth needed to support the growing cohort of elderly citizens. Europe's competitiveness could fall behind younger and growing populations in other world regions.

On the face of it, fewer people seems like good news for the environment. The population of Germany, Europe's most populous country, will shrink by at least 8 million by 2050 and this trend is set to be replicated in many of its neighbours. Remote rural areas, mainly in central and eastern Europe, might become depopulated over time. This should benefit biodiversity as displaced plant and animal species recolonise their old terrain. Given that the world population is still growing by about 200,000 people a day, and the ecological footprint of the human race already lies beyond the limits of sustainability, fewer European mega-consumers will be a blessing for the health of the planet - and fewer North Americans would be even better.

But look a little deeper, and the picture becomes more complicated. Decreasing population does not necessarily promise environmental benefits. The cost per head of population for infrastructure such as sewage systems or electricity supply increases when population numbers go down, making clean water and non-polluting energy even more expensive than they are today.

So can Europe overcome its demographic and ecological challenges at the same time? The solution might be found in a rarely discussed concept: demographic sustainability.

High population growth, such as that now taking place in many African countries, is not sustainable. But very low fertility rates are unsustainable too. It will be hard for countries with persistently low fertility to remain competitive, creative and wealthy enough to keep ahead of their country's environmental challenges. What is needed is a middle ground.

A demographically sustainable Europe needs to have a stable or slowly shrinking population as the existing infrastructure operates most efficiently when the number of inhabitants remains fairly constant. What would it take to achieve this? At present, the average fertility rate in Europe is 1.5 children per woman, and in countries below this line there is an urgent need for family policies to encourage women to have more children. Countries with fertility rates above 1.8, including France, the UK and Sweden, do not need further pro-birth policies as immigration will fill the demographic gap.

Europe's biggest challenge is to survive the peak of ageing, which will come around 2045. After that the baby-boom generation will leave the population pyramid, and Europe will enter a new phase of its demographic journey.

Until then, it is important to focus less on human quantity and more on human capacity; not on how many people there are, but on how productively they live their lives. Working life must be extended and Europe must invest heavily in education, as fewer young brains will have to deliver increased creativity and productivity. Every member of society will be needed, so Europe cannot afford to allow marginalised, socially underprivileged groups to languish.

Countries that learn to live in prosperity with an ageing, stagnant population, or even one that is shrinking, will be the trendsetters for a sustainable future. Europe has the chance to develop a blueprint for these modern societies - for economies that found their wealth and well-being not on growth but on stability.

Reiner Klingholz is director of the Berlin Institute for Population and Development in Germany. He is co-author of Europe's Demographic Future - Growing regional imbalances, published by the institute