

Sustaining growth is the century's big challenge

By Martin Wolf

Financial Times, June 10, 2008

Is it possible for the vast mass of humanity to enjoy the living standards of today's high-income countries? This is, arguably, the biggest question confronting humanity in the 21st century. It is today's version of the doubts expressed by Thomas Malthus, two centuries ago, about the possibility of enduring rises in living standards. On the answer depends the destiny of our progeny. It will determine whether this will be a world of hope rather than despair and of peace rather than conflict.

This – not the effectiveness of its particular prescriptions – is the biggest question raised by the [report](#) of the growth commission [discussed here last week](#). It is also the focus of a powerful new book by Jeffrey Sachs, director of Columbia University's Earth Institute*.

The challenge is stark. World real incomes per head could rise 4.5 times by 2050 and world population by 40 per cent. This would mean a sixfold increase in global output, concentrated in the developing world (see charts). Is such an increase feasible? The answer he gives is: yes and no – yes, because changes in incentives, technology and social and political institutions would make a benign outcome feasible; and no, because the path we are now on is unsustainable. Professor Sachs is an optimistic prophet of doom. He falls in between those environmentalists who see no solution and those free-marketeers who see no problem.

By inclination, I am far closer to the latter than the former. But it has become evident, at least to me, that the human impact on the planet on which we depend has risen to enormous proportions. We have treated the global commons as if they were free. Self-evidently, they are not.

Prof Sachs emphasises three goals: first, “the end of extreme poverty by 2025 and improved economic security within the rich countries as well”; second, “stabilisation of the world's population at 8bn or below by 2050 through a voluntary reduction of fertility rates”; and, third, “sustainable systems of energy, land and resources use that avert the most dangerous trends of climate change, species extinction, and destruction of ecosystems”. Finally, to achieve these ends, he recommends “a new approach to global problem-solving based on co-operation among nations and the dynamism and creativity of the non-governmental sector”.

One might view the first of the above goals as that of prosperity for everybody. Population control is related to this end because the world's poorest people are burdened by the costs of rearing its largest families. Finally, only by managing the global commons will it be possible to sustain rising living standards.

The most illuminating concept in the book is that of the “anthropocene” – the era in which human activities dominate the world. Peter Vitousek of Stanford University has

documented the ways in which humanity has appropriated the bounty of the earth for its own use: human beings now exploit 50 per cent of the terrestrial photosynthetic potential; they have put up a quarter of the carbon dioxide now in the atmosphere; they use 60 per cent of the accessible river run-off; they are responsible for 60 per cent of the earth's nitrogen fixation; they are responsible for a fifth of all plant invasions; over the past two millennia they have made extinct a quarter of all bird species; and they have exploited or over-exploited more than half of the world's fisheries.

Like it or not, we humans are now in charge. So what should we do? In his response, Prof Sachs shares the optimism of most Americans: we must fix it, but, he insists, we can do so only together. In this great venture, he argues, the US must share the leadership, but it cannot dictate to the rest of humanity.

In regard to the dynamics of catch-up growth in developing countries, Prof Sachs' views are close to those of the growth commission. More distinctive is his recommendation of an aid-supported, big-push investment strategy, aimed at lifting the world's poorest people, predominantly Africans, out of the poverty traps into which, in his judgment, they have fallen. Prof Sachs has made notable contributions to our understanding of the obstacles to development created by geography, the environment and devastating diseases such as malaria. In the current book, he emphasises how shortages of water are contributing to poverty and conflict across the planet.

Yet I am more sceptical than Prof Sachs of the returns to the big-push strategy. In many cases, it will fail. But it has to be tried, because there is no morally tolerable or credible alternative. I agree, too, that huge efforts must be made to accelerate the fertility decline in the world's poorest countries, albeit on a voluntary basis.

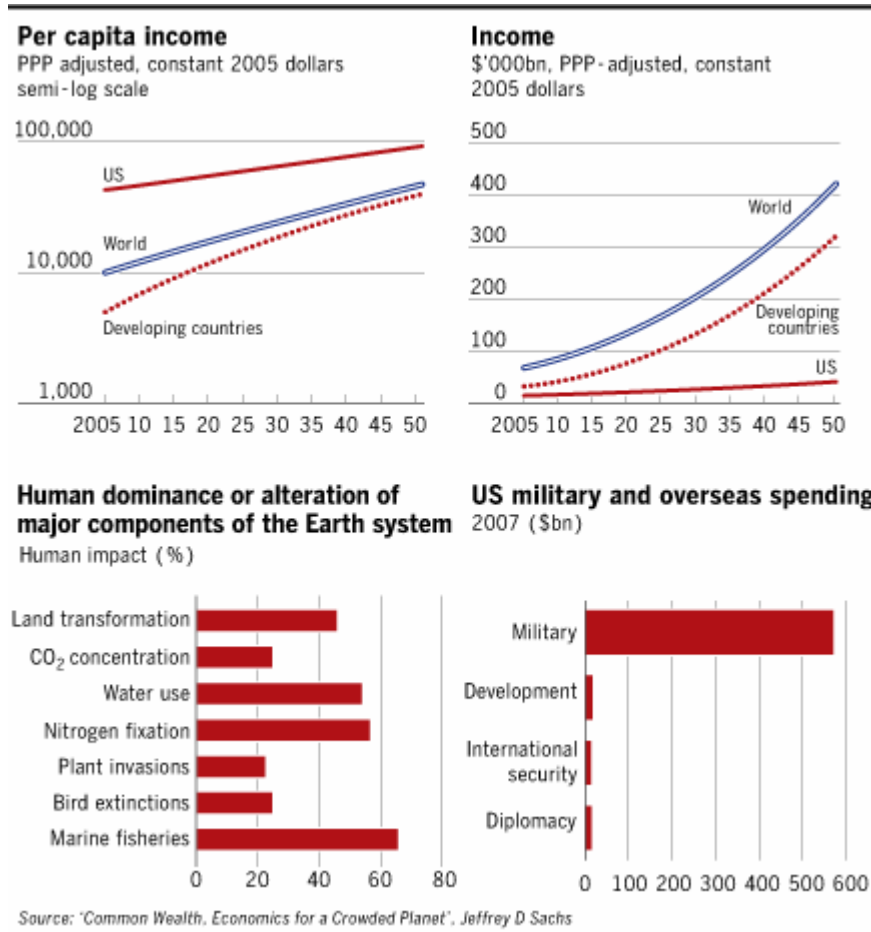
Now suppose that economic growth then spreads across the planet, as we would wish. Can it be sustainable? Prof Sachs is notably optimistic on direct resource inputs into growth. His view is that fossil fuel resources, renewable energy and availability of fresh water should be sufficient to support continued growth over the next half century. But this would almost certainly require a transition from oil-based energy technologies to ones based on coal and renewables. Energy would, almost certainly, be much more expensive than in the 1985-2000 period, but not prohibitively so.

The challenge, in Prof Sachs' view, is rather to make growth compatible with sustaining the global commons: species survival and, above all, climate change. Yet what is perhaps most intriguing of all is the optimism he shows on the latter task. While he embraces the view that climate change is a huge threat, he also believes it can be dealt with at modest cost, provided suitable incentives are put in place: less than 1 per cent of global income.

In all, in fact, Prof Sachs believes we can achieve all the goals he has set – elimination of mass poverty, population control and environmental sustainability – for less than 2 per cent of global incomes. This is about half a year's global growth and, as such, surely cheap at the price.

This, then, is an analysis that manages to be both pessimistic and optimistic at the same time. One might not be quite as optimistic about the cost of the solutions. But one must recognise the salience of the challenges. If economic growth halted, conflict among the world's people would risk becoming unmanageable. If the environmental consequences proved overwhelming, the costs of growth would become unbearable. We are the masters of our planet now. The great question for the 21st century is whether we can also become masters of ourselves.

*Common Wealth: Economics for a Crowded Planet (Allen Lane, 2008)



Read the debate - contributors so far include **Jeffrey Sachs, Paul Collier, William Easterly, Dennis Bennett** and **Brian Davey**.

5 Responses to “Sustaining growth is the century’s big challenge”

Comments

1. **Jeffrey D. Sachs:** Martin Wolf is right, in his generous review of my book (“Sustaining Growth is the Century’s Big Challenge,” June 11), that the biggest question in economics is whether there is room enough on the planet for 7 – 10 billion human beings, the tens of millions of other species, and economic convergence, that is the continued, reliable, and fairly rapid narrowing of income gaps between rich and poor due to technological catching up by the poor. The tendencies for convergence are powerful. Rapid economic growth in China and India reflect the powerful capacity of today’s poorer countries to close technology gaps. The results are impressive: income doubling periods of 7 to 10 years. The results are also harrowing: profound threats to the Earth itself, and therefore to continued economic development and even survival of vast numbers of people and vast parts of the biosphere.

Martin calls me both optimistic and pessimistic at the same time. My point is that either the positive trajectory or negative trajectory is possible, indeed both are plausible. I believe that physical resource limits alone will not do us in, or end economic convergence. On the other hand, the market economy by itself will not solve a now world-threatening crisis of sustainable development. The market system fails to solve four fundamental classes of problems: ecosystem functions (the bio-geophysical commons); population; extreme poverty (because of the very real dynamics of poverty traps); and technological pathways needed for sustainability. These are solvable problems. They require collective action, as they are fundamentally in the character of public goods. Yet for the same reason they are not solved. Part of the barrier is the ideology of market economics itself, which often denies these problems and therefore is short on producing practical tools and solutions.

The biosphere does not come packaged according to the assumptions of neoclassical economics. What we call externalities are the norms, not the exception. In ecosystems, the nutrients, carbon, water, nitrogen, energy, and species (including ours) are in flux. There are spatial migrations and temporal flows and interactions which make a lie of the underlying assumptions of “private” property. A farmer that encloses his farm, or drains groundwater, or introduces an invasive species, or puts on chemical pesticides, or replaces high biodiversity with a commercial monoculture, has pervasive effects on a whole ecosystem. These are, by nature, not fenced in his enclosure. None of this mattered in the extreme perhaps when the Earth was still populated by 1 billion of us, or perhaps even 2 or 3 billion. When local systems failed, there were new

ecological niches to conquer. Yet in the past 250 years, the population has risen nearly tenfold. There are no more places to flee. And ecosystems everywhere are under profound threat.

It is often said that we have beaten Malthus, but that is also not quite right. We have had two main solutions to Malthus. The first is voluntary fertility reduction, especially in the past half century. Malthus really couldn't imagine this. But the global demographic transition is still incomplete, and the human population is still rising by around 75 million per year. The second is massive mining of resources. We haven't simply figured out how to get more for less, as we usually assume; we have just as often figured out how to get more for more . . . more groundwater depletion, more habitat destruction, more fossil fuel use, more use of chemical pollutants, etc. Our "solutions" have been really only half solutions. We are clever indeed, but less clever than we pretend, by counting as income what is in fact pervasive depletion of natural capital.

The answer then to the question of whether we've beaten Malthus, is "Yes, no, maybe." Yes, we have enjoyed a pervasive rise in living standards ahead of the population curve, and have set in motion the powerful global dynamics for more. No, we have not done this yet in a sustainable manner. Populations are growing too fast, we are running out of some resources, such as conventional oil and fossil groundwater, and we will lose others, such as glacier melt. And maybe we can overcome these constraints as well, but with technologies which do not (quite) yet exist, or which exist but are still very costly, or which exist but for various reasons are not deployed (e.g. because the poorest of the poor can not afford them or because of market neglect of the commons).

Standard neoclassical economics makes four kinds of mistakes regarding sustainable development. First, it literally writes natural resources out of the baseline growth analysis. This is how we are taught on the first day, with the Solow and Ramsey growth models. This assumption is correct only if the neglected natural inputs are indeed available at constant cost relative to the outputs, in which case we can assume their effects away through aggregation. This is not the case. The recent rises of oil and food prices are real signals to the contrary. And there is even more output-threatening depletion and environmental destruction not yet registered in market prices. By the way, our international agencies until very recently operated with the same blithe assumptions. The energy sector forecasts of the International Energy Agency, for example, have been "demand-side" forecasts only, as they have implicitly assumed that the supply would be forthcoming, on the margin, at constant relative costs. In the same vein, mainstream economics vastly downplays the ecological costs of human activity, by treating the massive anthropogenic pressures as mere exceptional "externalities," rather than the pervasive rule. Again, this did not matter as much on a global scale until recently.

Second, market economics neglects the importance of population policy, especially to help promote a demographic transition in the poorest countries through a rapid, voluntary reduction of fertility rates. The rapid population growth in the poorest countries is to nobody's benefit: the poor themselves (especially the children's generation), the world, and the environment. It results from a combination of factors, including the pervasive lack of access of the poorest of the poor to family planning services and contraception, high child mortality rates (which discourage voluntary fertility reduction), and lack of public financing of education of girls through at least secondary level. The demographic trap, in short, is part of the poverty trap, and it is threatening to the poor, global stability, and long-term environmental sustainability.

Third, and closely related, mainstream economics assumes that production functions and financial markets are such as to ensure market-based economic growth even in conditions of extreme deprivation and lack of infrastructure. Technically, the baseline growth theory blithely assumes away poverty traps (for example, in the famous Inada condition of the first day of growth theory, which posits nearly infinite returns to incremental private-sector investments in capital-scarce economies such as Mali, Niger, Chad, and Somalia!).

Fourth, the implicit assumption of market economics is that if a technology is vitally needed, it will be found by market forces, perhaps augmented by (non-market) patent rights. Necessity will be the mother of invention, rather automatically. Yet economics teaches that knowledge — both science and the technology embodying scientific and practical know how — is not just another commodity, but a public good par excellence. It will be produced and diffused in insufficient amounts by market forces alone. Market-based technological pathways may sidestep entirely the technological needs of the poorest of the poor, and of the global commons, unless guided by public policies and action. The massive technological change, of the kind needed urgently in this century, requires a mobilization of public and private institutions and actions, new public-private partnerships (PPP), and a rich institutional environment for technological change. Massive technological innovations will require public financing at least an order of magnitude greater than today directed at technological innovations in sustainable energy, food production, water use, biodiversity conservation, and more.

My optimism is indeed that our technological prowess can be good enough to address the harrowing challenges, and that physical resource availability (energy, land, water, biodiversity) can suffice with the invention and diffusion of resource-saving technologies. I put great stock in renewable energies (especially solar power, which I believe will likely be the most important of all energy technologies by the end of this century, perhaps together with safe nuclear power), high-mileage automobiles, drought-resistant crop varieties, carbon capture and sequestration, anti-malaria bed nets and medicines, and much more.

My pessimism is that there is nothing automatic (in market terms) about the development and application of such solutions. They require a new kind of economic analysis; vastly greater public awareness and consensus; and global cooperation on a scale not yet achieved. We can end poverty with *existing* technologies for less than 1 percent of rich-world income, yet we think it's much more important to argue about that proposition than to try it (despite our endless promises at the highest political levels to try it), while in the meantime around 10 million children die each year of their poverty, and vast regions of the world are inflame in their hunger, disease, and desperation.

Are the vitally needed sustainable technologies within reach? Probably at modest cost. Many are already on the horizon, a "future that is already present." Are we making such investments? Plainly no. We have yet to master the full "value chain" of research, development, demonstration, and diffusion (RDD&D) to mobilize sustainable technologies at anything close to the necessary global scale and speed. Incidentally, a recent study by the International Energy Agency, **Energy Technology Perspectives 2008**, takes a similar technological perspective, and finds that around 1 percent of GNP invested per year in sustainable energy systems (mainly in close-to-market technologies) would be sufficient to cut global emissions by half by 2050 consistent with resource availabilities and continued rapid global economic growth. It's almost exactly the same conclusion and point estimate that I give, and is consistent with similar conclusions of Sir Nicholas Stern and others as well. It just won't happen by itself. Indeed, small tweaks to the market, such as carbon trading, are also insufficient, because those tweaks only modestly change the game along the entire RDD&D trajectory.

My point, in the end, is that our traditional debate – Should we be optimistic or pessimistic? – is not really the right framing of the question. The right issue is how to *achieve* the achievable sustainable development trajectory through an appropriate mix of public-sector and private-sector investment, backed up by a mix of public and private institutions at all scales. Good answers, I believe, will require a far more serious approach than our profession currently gives to these problems. We need to take very seriously indeed the role of natural resources and ecosystems in economic production (e.g. in food and energy); the pervasive and unprecedented anthropogenic forcings on natural systems; the multiple and deep failures of "private" property in crowded, stressed, and non-linear ecosystems; the existence of demographic and poverty traps which kill millions each year and which hold entire regions (e.g. the Horn of Africa and much of Central Asia) in a trap of political and social crisis; and the complexity of the processes of innovation and diffusion, which require a subtle and changing mix of public and private institutions operating locally, regionally, and globally.

Jeffrey D. Sachs is the Director of The Earth Institute, Quetelet Professor of Sustainable Development, and Professor of Health Policy and Management at Columbia University

Posted by: Jeffrey D. Sachs | [June 11th, 2008 at 10:44 am](#) | [Report this comment](#)

2. **William Easterly:** Professor Sachs argued in his new book and his previous book that the solution for people caught in a “poverty trap” is a Big Push consisting of aid money, an international agreement, and a UN plan. Professor Sachs expresses frustration that “We can end poverty with existing technologies for less than 1 per cent of rich-world income, yet we think it’s much more important to argue about that proposition than to try it.” Professor Sachs certainly has a right to his propositions, but they are as subject to the checks and balances of democratic debate as are any other policies. The Big Push policy idea was born in the 1940s and has been tried repeatedly since, failing to end or alleviate poverty where it was intensively applied (or else why would we still need it according to Professor Sachs?). The poverty trap idea dates from the same era and it has also been refuted by the successful escape from poverty of many societies without much aid as percent of their total income (China and India being the rightly-celebrated cases at the moment).

In his new book, Professor Sachs lists other grave global challenges that will not be solved unless we also apply to them the same formula of money, international agreements, and a UN plan. One of these challenges is Sachs’ revival of another old idea, that of The Population Scare - from Paul Ehrlich’s 1968 book *The Population Bomb* and the Club of Rome’s 1972 *Limits to Growth*. If the population problem is indeed scary, Sachs’ solutions give a dismal outlook once one considers the track record of aid money, international agreements, and UN plans. John Kay put it well in another [column](#) in today’s FT on the recent UN summit responding to the world food crisis:

“So the summit ended as such summits always do. The delegates agreed on the importance of the problem, the urgent requirement to spend more money: they emphasised the need for coordinated action, and resolved to meet again in future to reach the same conclusions.”

Fortunately for the world’s poor and for all the rest of us, there are much more dynamic forces in the world than UN bureaucrats and their academic advocates. Private, political, and social entrepreneurs, creative scientists, technological innovators, and resourceful workers and farmers found a way to escape “poverty traps” - the world poverty rate has declined by half over the last 30 years - and to avoid the famines and growth crash predicted by Ehrlich and the Club of Rome in the 1960s and 1970s. It is never a sure thing to predict that future problems will be solved in a similar way, but this historical record gives one a lot more hope about these challenges than one can derive from yet more toothless international agreements.

Posted by: William Easterly | [June 11th, 2008 at 8:59 pm](#) | [Report this comment](#)

3. **Paul Collier:** Nature is bountiful: we would be dead without it. I am going to propose a simple taxonomy of processes and actors that may help us to think through the economics of the natural world. Future bounty depends upon three distinct processes and four distinct groups of actors.

The three processes are the depletion of non-renewable natural assets; the dividend from renewable natural assets and the offsetting payments on natural liabilities; and the harvesting of crops.

Fears of 'running out of oil' are the key instance of the depletion of a non-renewable asset. The economic process here is the 'Hotelling Rule' that the real price of the commodity should broadly rise at the world rate of interest: this comes from viewing commodities as storable assets that should yield a return like any other asset. If firms have sufficient confidence in this principle they invest in the technological research needed to discover ways of reducing the need for the commodity. The astounding path of the oil price over the past fifty years demonstrates how woefully financial markets have failed to internalize the Hotelling rule. We simply don't know how difficult it will be for technology to keep abreast of depleting resources, but to date it has always come to the rescue. Depletion is faster than previously, but so is technological innovation.

Fears of plundering the world's renewable assets and accumulating liabilities are primarily about the likely mismanagement of 'common pool resources'. Fish, forests and carbon are all in this class of problem. The efficient solutions generally involve the creation of private property rights. However, the assignment of these rights requires cooperation and gives rise to acute problems of lobbying that may frustrate the entire approach.

Fears that the world will not be able to feed itself are about a production process, agriculture, in which one input, land, is in finite supply. Like any other production process this is about technology, organization and incentives. Fortunately, so many mistakes have been made on all three that there is considerable scope for increasing supply. Further, although land is finite, we are nowhere near the land frontier. Global warming will actually expand the frontier as it opens up huge tracks of central Asia to cultivation.

Who are the four groups of actors? The responsibility for the natural world rests primarily with national governments. Nature is best-approximated by land area and governments ultimately control the management of their territory. The land area of the world divides into four quadrants of distinct governance. One quadrant is the OECD. Governments in this group of countries are generally accountable to their citizens so that solutions that require only national-level action should be easy. The qualification is that not all citizens have equal influence: democratic politics is damaged by differential lobbying and to date this has distorted policies, especially those concerning the harvesting of nature. Even solutions that require international action should be feasible because this group of countries have a long

tradition of cooperation, although naturally larger countries are less familiar with cooperation than smaller ones because they have had less need for it. The second quadrant is controlled in effect by just two people, Putin and Hu Jintao. On their personalities rests the management of a quarter of the natural world. The third quadrant is the 58 governments of the ‘bottom billion’. Here, both weak governance and poverty are likely to produce high discount rates, leading to poor management of natural assets, so the first two processes are in jeopardy. The final quadrant is everyone else: around 110 countries. Here governance is usually reasonable and so solutions that require only national-level action are likely to happen, but there are so many countries that solutions requiring international cooperation are going to be really difficult.

Paul Collier is the author of [The Bottom Billion](#). His next book, [Wars, Guns and Votes: Democracy in Dangerous Places](#) will be published in February 2009.

Posted by: Paul Collier | [June 12th, 2008 at 12:17 pm](#) | [Report this comment](#)

4. **Dennis Bennett (guest):** I agree with Martin Wolf and with Professors Sachs, Easterly and Collier that the “Bottom Billion” require outside assistance to move them out of their current conditions. However, I strongly disagree with Professor Sachs that a large government-funded intervention is required to lift Africa out of its poverty trap. Rather, substantial positive gains can be achieved through private sector initiatives, when people are willing to develop creative solutions, transfer knowledge, and be persistent. It is the human element, accompanied by skillfully applied funding, that will lift Africa out of poverty.

I am the co-founder of Servant’s Heart Relief, a medium-size NGO that has been working in one of the most forgotten places on the planet: Eastern South Sudan. Over the past seven years, Servant’s Heart Relief has successfully moved most of the 500,000 people living in that 15,000 square miles of “African Bush” from stone-age living conditions to living conditions that roughly approximates the United States frontier of the 1850s. We have accomplished this transformation primarily with donations of time and money from private individuals, schools and churches and through efforts principally executed using indigenous talent and workforce, not westerners. We have also partnered with specialized aid agencies when possible.

To put our experience in perspective, when Servant’s Heart Relief started working in this region in 2001, the area had recently been rescued from 20 years of war. We were the first westerners to visit this region of Africa since 1956. The first village had more than 1,000 people—sharing only 1 iron axe, 3 cooking pots, and 4 goats. They were eating leaves from the local trees as a food and were drinking river water that was so full of mud combined with human and animal waste it looked like chocolate milk.

To paraphrase Professor Collier's terminology, this area could be classified as part of the "Bottom Million". Our goal was to bring this area to a sustainable level of self reliance and economic activity without creating an "entitlement" mentality. Rather than benchmarking economic progress by GDP or earnings per capita (a meaningless concept under stone-age conditions), we decided to benchmark progress against the history of human economic development. Our rationale was that we would have helped them achieve near-term self-reliance if they were to move into at least the pre-steam-engine era farming community typical of the 1850s United States Midwest region.

Achieving economic self-reliance in the area required that we focus on four primary areas of development: infrastructure, healthcare, water and sanitation, and education. The logic for our focus was straightforward: achieving self-reliance requires a certain level of infrastructure, but also a healthy population. A healthy population requires healthcare facilities as well as clean water and sanitation. Long-term self-reliance and growth in the future requires a literate population. Seven years later, the area is nearly self-reliant in food production, absent unusual events such as drought, floods or restarting of the war. The herds of cattle and goats have reproduced to almost pre-war levels. Another indicator of economic well-being is that a local "farmer's market" is starting to develop in some of the villages, where surplus food, animals and locally produced items such as beds or chairs can be bought or sold.

In the health sector, we reduced the mother mortality rate during childbirth from almost 50% to less than 10%, through hiring and training midwives and community health workers. The incidence of dysentery has decreased from greater than 80% of the population to less than 20%, through building water wells and teaching classes on hygiene and sanitation, including information on digging and using latrines. We still have many incidences of "forgotten" diseases such as leprosy, children still die of measles and whooping cough, and there are still too high a number of cases of malaria because there are never enough impregnated bed nets.

In education, we now have 2,000 students attending three schools, from grades Primary 1 to Primary 6, taught by indigenous teachers trained by Servant's Heart Relief. Five different local tribes are represented among the student body, with classes taught in English so that no tribe is at an advantage. Yet there are still thousands more students that should attend Primary School, and we need to solve the problem of instituting secondary education.

In summary, it is possible to help move the "Bottom Billion" from near-stone-age conditions to economic self-reliance without large government programs, if people and donors are willing to be persistent and somewhat creative. Servant's Heart Relief still has a long way to go before we are finished, but one of the best testimonials to our success so far is that neighboring areas want us to expand our programs into their region, as they see the important changes in the areas where

we are currently working. If it works for these “Bottom Million” in a conflict zone in Africa, the principles will work in the rest of Africa as well.

Dennis Bennett is co-founder of Servant’s Heart Relief and has more than 25 years of experience in international banking and risk management. Servant’s Heart Relief has 70 indigenous staff in Sudan and Kenya.

Posted by: Dennis Bennett | [June 13th, 2008 at 9:47 am](#) | [Report this comment](#)

5. **Brian Davey** (*Guest contributor*: Jeffrey Sachs has a totally inadequate sense of the scale of the problem. There are 3 reasons: firstly many economists like him are still looking at the climate science of a few years ago. In the last couple of years climate scientists are stressing reinforcing feedbacks in the climate system, hence accelerating climate change in an avalanche effect. The Arctic may be ice free by 2012 - with a huge change in the Earth’s albedo and that alone may add 0.3degrees C, triggering methane releases and the beginning of the runaway process. So we are really on the brink. The leading climate scientist James Hansen says that a safe level of CO2 in the atmosphere is 350ppm - whereas we are already 387 and EU and Stern targets 550ppm. As if that were not bad enough more expensive oil and gas is driving towards a more carbon intensive fuel mix - exploiting Alberta tar sands is driving Canada out of Kyoto and coal use is set to grow massively with CCS 20 years or more from generalisation and therefore too late to be any use. A third reason for concern is that, after decades of wasting energy because of low energy prices, while there are wasteful practices which can be reduced as “low hanging fruit” at a low carbon price, once these are dealt with climate mitigation will get much much more expensive. There is evidence in the IPCC 4th Assessment Report Fig. SPM 10 that there will be viciously diminishing returns for energy saving and conservation effort. It shows that increasing the cost of carbon 5-fold, from \$20/t to \$100/t in 2030 barely increases the level of mitigation at all in transport, buildings and waste. In industry it increases it only 3 times, in agriculture slightly more than doubles it and in forestry it is less than double compared with the initial effect of the \$20/t cost. Once the “low hanging fruit” are dealt with the entire industrial structure needs fundamentally recasting to make progress.

That brings us to the main point. There is a global emergency here and it requires massive lifestyle and matching economic structure changes - a relocation and ecologicalisation of economic relationships. The problem goes deeper than whether changing technologies with existing development models will or will not deliver increased incomes to growing populations. This scale of restructuring can only be achieved with a population mobilisation treating the situation with the urgency of a war. I mean by this something like the follows: Military outlays as a percentage of national income in the UK 1939 15%; 1940 44%; 1941 53%; 1942 52%; 1943 55%; 1944 53%.

No I don't think its very likely to occur. I never had children because I'm not convinced humanity will see this century out. Nevertheless one must do what one can and there are some great people out there doing what they can to demonstrate the alternative lifestyles in practice and how we could be happy in reconstituted homes, gardens and communities - as well as the designing the necessary policies, living in the agony of faint hope.

Nonetheless there is some hope. As they say - there was a great sense of common purpose in the war and if they were not killed or injured in combat more exercise and a better diet left many people and society healthier and more generous. You never know..."

Posted by: Brian Davey | [June 13th, 2008 at 1:18 pm](#) | [Report this comment](#)

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