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Challenge of Nonviolent Population Decimation

Reducing effects of overpopulation on resources and climate change by major reduction in the height of people

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Earlier versions distributed under the titles:
Reducing Global Effects of Overpopulation by Reducing the Average Size of Members of the Population
Shorter People: Reducing effects of overpopulation on resources and climate change by major reduction in the height of people

Introduction

This is a preliminary exploration of the merits of reducing the average size (body mass) of the population -- thereby reducing the human biomass -- as a means of reducing the effects of overpopulation (notably on climate change). It follows from an earlier exploration that argued for a radical response to human settlement-related issues through thinking "voluminously" rather than "laterally" (*From Lateral Thinking to Voluminous Thinking: unexplored options for subterranean habitats in dense urban areas*, 2007). The purpose is to reframe the question asked by Ross McCluney (*How Many People Should the Earth Support?* 1999) in a manner that has not seemingly been previously considered.

It is assumed that many major problems of current global strategic concern would be significantly reduced if the global population itself was reduced. Such problems include: energy resources, food resources, water resources, global warming, non-renewable material resources, immigration pressures, etc. The challenge has been characterized by Warren M. Hern (*Why Are There So Many of Us? Description and Diagnosis of a Planetary Ecopathological Process*. *Population and Environment*, 12, 1, Fall 1990) in the following terms:

> The human species is a rapacious, predatory, *omniecophagic* species engaged in a global pattern of converting all available plant, animal, organic, and inorganic matter into either human biomass or into adaptive adjuncts of human biomass. This is an *epiecopathological* process that is both immediately and ultimately *ecocidal.*

All the above-mentioned problems call for imaginative solutions if humanity's response to them is to be capable of reducing their ever increasing impact.

Characteristics of radical technical remedies for global warming -- as currently proposed

In a BBC interview (Molly Bentley, *Guns and sunshades to rescue climate*, 2 March 2006), the chief scientist for climate change projects at the Climate Institute in Washington DC indicated that: "*Humans are changing the Earth, and it's a big effect we're having,... To really stop climate change in its tracks, you have to go to virtually zero emissions in the next two decades.,,, So the question is, is there a silver bullet that can help us to limit the amount of climate change?*"

A number of technically radical solutions have been proposed to achieve rapid reduction of such problems as global warming.

- reflecting solar space shield (parasol) proposals of various kinds are currently the subject of a NASA study. They include::
  - James T. Early (Lawrence Livermore National Laboratory) proposed siting a 2,000 km-wide glass deflecting panel at the "inner Lagrange point" between the Earth and the sun (*Space-based Solar Shield to Offset Greenhouse Effect*, 1989)
  - the U.S. National Academy of Sciences proposed in 1992 launching 55,000 "solar sails" or "orbiting mirrors" into orbit around the Earth, each with an area of 100 square kilometers, the sails collectively producing the same effect as Early's single glass panel and would together reflect enough sunlight to counter about half the doubling of carbon dioxide; any larger than 100 sq km would need a manufacturing plant on the Moon.
  - creating a cloud of 16 trillion miniature reflective parasols -- each just 60 cms in diameter -- to shade the Earth from the sun, requiring an estimated 20 million separate space missions to get them up into orbit [more].
  - creating an artificial planetary ring around the Earth composed of passive particles -- estimated to cost $4-6 trillion.
  - Roger Angel, a physicist at the University of Arizona, and others, have proposed using millions of small spacecraft to create a solar sunshade or "umbrella" -- a network of tilted mirrors in orbit -- that would deflect about 10 percent of the sun's light from the Earth. It would take 25 years and several trillion dollars to build. [more]
  - the creation of a (less costly) stratospheric solar shield, notably proposed in 2006 by Paul Crutzen (winner of the 1995 Nobel Prize for Chemistry), using sulphur particles -- given the degree of solar reflection following major volcanic eruptions. One of the problems of putting sulphate particles in the stratosphere is that it would destroy the ozone layer; so that solving the global warming problem would probably also destroy the human population. [more; more] .
  - Ken Caldeira (Carnegie Institution Department of Global Ecology at Stanford University in California) has investigated the possibility of moving the Earth itself, cooling the planet by shifting its orbit further from the Sun. He found it would require the energy of five thousand, million, million hydrogen bombs to move Earth's orbit 1.5 million km out, which would compensate for doubling CO_2 in the atmosphere.
- painting all the world's roads white to reflect sunlight back out into space and so lower the Earth's temperature.
- creation of artificial "trees", as advocated by Klaus Lackner of Columbia University, namely air filters that capture carbon dioxide from the air using chemical absorbers and then compress the carbon dioxide into a liquid or compressed gas that can be shipped elsewhere; they would be some 60 meters high, and some 100,000 might be built near wind turbines.
- 'fertilization' of the world's oceans with iron so that, as they grow, surface algae would absorb carbon dioxide from the air for photosynthesis, eventually sinking to the ocean floor after they die, thus "sequestering" the carbon on the seabed. Experiments are already under way by a private corporation Planktos Inc [more]. At least nine national governments and the European Union (EU) have supported such experiments
- some dozen countries are involved in experiments at modification of stratospheric weather, notably by bombarding clouds with chemicals ("cloud seeding") to trigger production of rain [more].
- Craig Venter, who mapped the human genome, is committed to creating a new life form -- a synthetic construct based upon simple microorganisms -- that could be designed to clean up pollution, carbon dioxide or other greenhouse gases.
- Australian scientists are exploring the possibility of using genetic engineering to give kangaroo-style stomachs to cattle and sheep in a bid to cut the flatulent emission of greenhouse gases [more]

Such "geoengineering" and related options -- labelled by some as "wacky ideas" -- are considered to be largely speculative and with the risk of unknown side-effects. Nevertheless the *Technology Quarterly* of the *Economist* (*Plan B for global warming?* 8 March 2007) also presents them as the only alternative to cutting carbon emissions -- without envisaging any other. It notes that "*Although most climate scientists do not like to talk about it, cutting greenhouse-gas emissions is not, strictly speaking, the only way to solve the problem of climate change*".

> *Can the ecohackers save us?*
> (Danny Bradbury, *The Guardian*, 29 May 2008)
> One of the biggest worries... is that such tinkering could produce complicated outcomes. For example, spraying sulphur into the atmosphere might reduce the sunlight by 2%... but what will it do to the rain? ...
>
> Some would-be ecohackers... may have been over-optimistic, but most of today's geoengineers are more cautious in their studies...[and]... would be horrified if we did this for any reason other than as a last resort....
>
> The potential side-effects of geoengineering and the cost of doing it in space would be inhibitors to doing this unless we felt desperate,
>
> The simplest thing is to stop putting in the gases that cause the warming... When it comes to preventing the conditions that might make governments take geoengineering projects seriously, we all have our hands on the climate dial.

Of "fig-leaves" and "cover-ups"

Since these proposed remedies by distinguished scientists are a response to a symptom rather than a cause it would appear that there is also a case for radical thinking regarding overpopulation and the consequences of population overshoot in relation to

resources. None of the above solutions addresses the fact that continuing exponential growth in population will rapidly undermine any such short-term remedies to global warming. They are in fact conceptually ill-founded from a systems perspective -- as first demonstrated by the *Limits to Growth* study in 1972. Ironically, given the root of the population issue, such climate change remedies are well-caricatured as a "fig-leaf" to avoid recognition of the underlying issue -- a dubious "cover-up".

As asystemic remedies, initiatives to reduce global warming can be justifiably recognized as intellectually dishonest and irresponsible in the face of planetary emergency. Any "silver bullet" response may then be credibly proposed from that mindset -- provided it does not address the issue of overpopulation.

As dubious forms of "value exchange", global carbon trading and carbon offsetting initiatives may well come to be judged by history as systemically analogous to the medieval sale of papal indulgences which were the subject of Martin Luther's *Ninety-Five Theses on the Power of Indulgences* (1517) -- considered to be the catalyst for the Protestant Reformation. This comparison regarding "sins of emission" has already been strongly made (*Carbon Offsets*, *Economist*, 3 August 2006; George Monbiot, *Selling Indulgences*, *Guardian*, 18th October 2006; Carbon Trade Watch, *The Carbon Neutral Myth: offset indulgences for your climate sins*, 2007; Saul Gomez, *Offsets: the indulgences of today? Policy Innovations*, August 24, 2007). The comparison is discussed separately (*Global Market in Indulgences: extending the carbon trading model to other value-based challenges*, 2007).

Clearly it is an environmental analogue to the "protestant reformation" which is to be anticipated -- although lessons will hopefully be learnt from its failures. The policy mindset from which the strategy has currently arisen could promote application of the model to other forms of "sin", including criminality, violence, and the like -- and may well be seen to have effectively done so already in the case of human rights abuses.

It is curious, if not symptomatic, that most of the technological fixes should emanate from the country widely recognized to be least prepared to constrain the exploitation of resources associated with its lifestyle. Curiously also, in the light of the painful difficulties in establishing any consensus on the *Kyoto Protocol*, the purportedly "scientific" proposals fail to address the issues of the political consequences of a technocratic group of nations undertaking such geoengineering unilaterally without seeking the consensus of other nations of the world.

As argued by Gregory Benford, professor of physics at the University of California with respect to the "suspension of tiny, micronized harmless particles" in the stratosphere, this could take place "outside national boundaries":

> High-altitude trials over the open ocean are little constrained by law or treaty, so show-stopper politics may br avoided. These first stages will be scientific experiments, not vast engineering projects... As economist Robert Samuelson recently said, 'The trouble with the global warming debate is that it has become a moral crusade whenn it is really anengineering problem. The inconvenient truth is that if we dont't solve the engineering problem, we're helpless'. (*Save the Arctic -- Now*, 2007).

As reported in a helpful summary of the above initiatives by Pat Mooney (*Global Warming: The Quick Fix Is In*, *Foreign Policy In Focus*, February 20, 2007), the US government has been lobbying the UN Intergovernmental Panel on Climate Change in support of such geoengineering options. Experimentation by governments and corporations, notably on weather modification, has long taken place in the absence of public discussion. As Mooney notes, the political and ethical dimensions of such climate modification are huge.

Seemingly with little recognition of the unpredictable consequences of the introduction of species (to which Australia is so sensitive, with reason), Alun Anderson, former editor-in-chief of *New Scientist*, advocates a genetic engineering approach to the energy challenge of global warming, namely "reprogramming the genetic makeup of simple organisms so that they directly produce usable fuels -- hydrogen, for example" (*The Sunlight-Powered Future*, 2007). The technological fixes proposed within the current techno-optimisitic mindset take no account of disastrous consequences, considered to be of "low probability", that may be associated with them -- as so ably documented by Nassim Nicholas Taleb (*The Black Swan Effect: the impact of the highly improbable*, 2007).

With healthy frankness, Ross Gelbspan (*Beyond the Point of No Return*, *Grist*, 11 December 2007) remarks:

> As the pace of global warming kicks into overdrive, the hollow optimism of climate activists, along with the desperate responses of some of the world's most prominent climate scientists, is preventing us from focusing on the survival requirements of the human enterprise.
>
> The environmental establishment continues to peddle the notion that we can solve the climate problem. We can't.
>
> We have failed to meet nature's deadline. In the next few years, this world will experience progressively more ominous and destabilizing changes. These will happen either incrementally -- or in sudden, abrupt jumps.

Perhaps such frankness is to be considered a characteristic of the "protestant reformation" -- a "naturist" response to the "cover-up"?

Realistic constraints

The rate of global warming is now recognized to be directly related to the activity of a human population of increasing size. Other increasing resource-related challenges are also associated with the size of the human population.

It is widely assumed -- to the point of avoiding debate on the matter -- that population growth cannot be restrained in any significant manner. The possibility is considered fundamentally unacceptable according to current political norms and values -- to the extent that the

possibility is even raised. The role of religions in avoiding any significant form of global family planning strategy is discussed elsewhere (*Root Irresponsibility for Major World Problems: the unexamined role of Abrahamic faiths in sustaining unrestrained population growth*, 2007). **The point is notably made there that from a systemic perspective the current appeals for urgent "action now" on climate change are usefully to be understood as a "fig-leaf" designed to cover up the challenging underlying issue of population overshoot.**

The language used in denying the implications of population even has a freudian quality, as illustrated in the argument of Gregory Benford (2007): "The main thrust is to carefully use our ability to attack warming at its roots -- incoming sunlight now, carbon dioxide later". There is even ill-considered enthusiasm for increasing human lifespans, despite the existing challenge to social security safety nets for the elderly (Leo M Chalupa, *We Will Lead Healthy and Productive Lives Well Past our Tenth Decade*, 2007; Marvin Minsky, *New Prospects of Immortality*, 2007).

Clearly any deliberate effort to reduce the population by mass termination (or even voluntary euthanasia) is unacceptable, although the "inadvertent" reduction of population numbers as a consequence of natural disasters, epidemics and war may well be seen as having some "positive" consequences -- however much the suffering is to be regretted (as in the case of the so-called Great Famine in the Ukraine, 1932-33).

Much emphasis is placed on arguments that appropriate economic development would lead to a natural reduction in fertility rates. This argument would seem to be inadequate in the face of the rapid increase in world population in past decades accompanied by only a very partial reduction in the level of world poverty -- and with little prospect of any future reduction impacting significantly on issues of population overshoot. Faced with probable demands on resources, the optimism of some is unbounded, as for the science editor of *The Economist*, Geoffrey Carr (*Malthus was Wrong*, 2007) :

> However, it is impossible to argue with the facts, and the facts are that the rate of population increase is dropping and that the drop is correlated with increases in pesonal economic well-being.... None of this means that the eventual human population of say, 10 billion, will be easy for the planet to support. But such support will not be impossible, particularly since economic growth in rich countries is less demanding of natural resources for each additional unit of output than is the case for growth in poor countries.

Radical possibility

In the spirit of thinking "voluminously" (*From Lateral Thinking to Voluminous Thinking*, 2007), it is appropriate to recognize that many of the problems caused by so-called "overpopulation" are primarily due not to the ever increasing **absolute number of people** but rather to the ever increasing **total volume of people**. The latter is to be understood in terms of size or body mass of the human population **as a whole**. The issue discussed here is not primarily one of individual obesity, as evaluated by the body mass index, but rather in terms of the total mass of humans and the resources required to sustain it.

A radical possibility that merits some consideration is therefore one in which the total volume (or mass) of humans is reduced within a foreseeable period of years -- commensurate with the predicted impact of the consequences of unrestrained population growth. Given the above constraint, a basic design requirement for any viable remedy is one that does not constrain fertility rates nor accelerate mortality rates.

It is therefore proposed that consideration be given to reducing radically the average size of human beings through administration of growth inhibitors or retardants.

The biochemical products for growth acceleration of both plants and animals have long been studied and marketed. In the case of animals consumed by humans, growth hormones are a common product used to increase farm productivity -- and contribute directly to the increase in human body mass (cf *Causes of Obesity: Animal Growth Hormones*). Growth hormones are available to enhance human growth, especially if this is inhibited by some inherited genetic condition.

It is therefore clearly possible to develop growth inhibitors, as used in growth hormone deficiency treatment, to reduce the average size of an adult human. This can be achieved over one or two generations -- within the time predicted for the full problematic impact of some of the resource-related problems, including climate change.

Average human height as a measure of wellness of individuals and as a measure of the degree of threat to the planet

Human height and growth have long been recognized as a measure of the health and wellness of individuals. Average height is increasingly used as a measure of the health and wellness (standard of living and quality of life) of populations. However this narrow focus takes no account of the progressively increasing impact on restricted environmental resources associated with such growth in height. Average height increase is therefore a measure of the damage of populations to the environment. Would ever taller people make for both ever increasing wellness and for an environment of ever improving quality?

Comments

Family planning: The recommendation avoids the problematic issues relating to family planning and the constraints of religious injunctions to "go forth and multiply" (*Genesis 1:28*) -- providing that such injunctions are not interpreted as applying in terms of increasing the number of cells affecting individual size (cf *Begetting: challenges and responsibilities of overpopulation*, 2007). Theologically it might therefore be considered as a creative reconciliation of multiplication and division.

Right to life: The proposal avoids the fundamental concerns of the "right to life" advocates concerned at the "murderous" termination of a foetus through abortion -- or even the use of contraceptives. It should not therefore engender opposition amongst such constituencies.

Nonviolence: The proposal is essentially nonviolent, little different from the current use of other forms of remedial medication. As such it should in no way be compared with the much-cited proposal of Jonathan Swift (*A Modest Proposal*, 1729) -- although his fictional account of the constraints on his excessive size, as considered necessary by the Lilliputians ("not six inches high"), is of some relevance (*Gulliver's Travels*, 1726).

Dissemination of growth inhibitors : Growth promoters have been successfuly, if inadvertently, disseminated through the growth hormones used in the meat selected as food of choice in the fast food outlets that proliferate in countries exposed to the western economic growth model. Deliberate choice has ensured the successful dissemination of sexual enhancement drugs (Viagra and analogues) -- a surprising growth industry. Water fluoridation has been successfully introduced in some regions on the assumption that it reduces tooth decay, by analogy with fortifying salt with iodine, milk with vitamin D and grape juice with vitamin C. With respect to any such dissemination of growth inhibitors, careful review of the opposition to water fluoridation and to beef hormones will be required.

Existing size variation: One concern would be any apparently discriminatory application of size reduction medication given the differences in average sizes of peoples and ethnic groups around the world. This matter therefore merits careful exploration. There is a case for recognizing the extent to which the anchoring of an extraordinary proportion of resources within the human biomass has also effectively been accompanied by a form of "gigantism" -- of which growth in average height over past centuries could then be considered an indicator.

Trading body mass credits: The concern of the previous point might well be approached in the light of the various innovative policy initiatives now being developed for carbon credit trading and emissions trading -- however that is understood. In this case however the "carbon" is that tied up in human body mass -- suggesting another connotation to personal carbon trading. There are however clearly challenges to be resolved in any initiative enabling the "fat to get fatter" (or larger) by paying the "thin to be thinner" (or smaller) -- although it might be argued that this is effectively currently in place between "developed" and "developing" countries.

Impact of size reduction: A comparative investigation is clearly necessary into the precise relation between body mass and ecological footprint -- and how this would be affected by the reduction in the average size of an adult human. How would such figures aggregate nationally, regionally and globally? What degree of individual or collective (average) size reduction would have what effect on various resource demands? How significant would this be and over what period of time?

Measurement framework: Of specific interest is the relation between calorie intake and ecological footprint (cf Ecological Footprint Calculators), notably in relation to industrial output (cf H. A. Kraut and E. A. Muller, *Calorie Intake and Industrial Output*. *Science,* 1946) in the light of estimates that, despite their achievements, American pioneers had only half the calorie intake of their descendants today. These three together create a triangular measurement framework within which viable individual size(s) for a sustainable society might then be determined. This approach should take account of the reframing of industrial output as gross domestic product (GDP) and current interest in what lies "beyond GDP".This is especially significant in that a study has shown that high population growth, depletion of natural resources, and low savings now pose new risks to development prospects (UNEP, *Beyond GDP: new measure of wealth shows that many developing countries are in the red*, 2005).

Smaller people -- Much smaller footprint !
One foot height people -- Very small footprint guaranteed !

Do ecological footprint calculators enable people to understand the beneficial impact to the planet of much smaller children? If not, why not? Do they enable understanding of the lower ecological footprint of populations of lower average height? If not, why not?

Would there not be great merit in enabling people to understand their cumulative ecological footprint through their children and grandchildren -- allowing them to experiment with decisions they might make on both the number of children and their average height as adults. How does the size of the family (envisaged) over one or more generations get factored in for consideration? One could be very "light-footed" in the first generation but have a very heavy footprint through one's grandchildren!

Impact on infrastructure requirements: Any envisaged further study (and simulation model) would need to distinguish the impact of individual size and human biomass reduction in relation to: food requirements, space requirements (housing), transportation requirements, energy requirements, etc. For example, at what point does it become feasible to:

- adapt buildings by splitting every floor into two levels, or by cutting every floor area in half?
- reduce the size of plots of land required for the construction of family housing?
- split every road lane into two or more lanes (for vehicles half the size) rather than increasing the number of lanes?
- increase the carrying capacity of airplanes rather than increase their numbers and airport size?
- expect that average calorie (water, energy) requirements for one individual will be adequate for two?

A particular issue is at what point such effects will impact usefully on urgent problems such as carbon emissions and the like

Psychosocial sensitivities: Given current experience and concerns relating to discrimination based on obesity and various measures of size, further study would need to clarify sensitivity on these matters -- especially during a period in which a younger generation would be of smaller average size and facilities would have to be maintained for those of the passing generations of elders of much greater size. There may indeed be real challenges to positioning the strategy appropriately given the cultivated mindset that "size does matter" and despite the unexplored connotation of the seminal study of E F Schmacher (*Small is Beautiful: Economics As If People Mattered*, 1973)

Assumptions regarding size and development: There is a case for exploring any psychological associations between socio-economic development and physical size -- and the implicit assumption that the pursuit of the conventional development growth model is in any way correlated with expectations regarding growth in physical size. Is a "developing country" in effect assumed to be one in which the body mass of individuals is expected to increase, whether or not the total body mass of the population increases? Of particular interest is the extent to which the dominant economic "growth" model in society is "incorporated" or "embodied" in individuals, whether physically or metaphorically in some way.

Overuse of resources and size: There is a need to clarify whether relative overuse of resources by a society is directly correlated with excessive increase in average size, and how increase in average size may be inappropriately associated with status or age. Societies with people of smaller average size might then usefully be reframed as "more developed" (rather than "less developed") -- in relation to the challenges of size reduction in order to meet the conditions of environmental carrying capacity.

Discriminatory sizeism: The previous point clearly calls for a new focus on discriminatory "sizeism" both within societies and between societies around the world -- notably in relation to pygmies and dwarfs (and the vital genetic potential they may represent).

Relative brain size: The ratio of brain weight to body mass is correlated with intelligence. Brain size offers a rudimentary indicator of intelligence. The brain is however a metabolically expensive organ, and consuming some 25% of the body's metabolic energy. Smaller brains might be advantageous from an evolutionary point of view if they are equal in intelligence to larger brains. Any reduction of body mass might therefore be usefully associated with a relative increase in skull size to accommodate brains of proportionately greater size.

Impact of greater range of sizes: The above clarification may be vital in the light of the increasing spread in size of individuals in any population as a variety of approaches to size reduction are developed within societies or within families. The challenge evident in the range of clothing sizes currently required would be expected to be considerably increased..

Dynamic adjustment of optimal size: Given the vaunted possibilities of genetic engineering, it may be a matter of ensuring that average size of members of the human population is adjusted dynamically in response to resource availability. As resources become less readily available, the average size might then be progressively reduced -- as has tended to occur naturally in times of food scarcity.

Viability of size reduction through animal-human genetic combination?

As reported by Nic Fleming (*Britain Signals It Will Allow Creation Of Animal-Human Genetic Mixes*, *The Daily Telegraph*, 2 March 2007), scientists are to be allowed to create part-human, part-animal embryos for research into potentially life-saving medical treatments. The government:

> proposes that the law will contain a power enabling regulations to set out circumstances in which the creation of hybrid and chimera embryos in vitro may in future be allowed under license, for research purposes only.

Whilst initial research will focus on hybrids involving larger animals, including rabbits, there is presumably no reason to oppose genetic mixes involving smaller animals -- such rats or mice -- in order to meet the decimation challenge -- surely of "life-saving" merit. Consideration could also be given to human-cockroach mixes, especially since the latter are much more efficient in converting foodstuffs into bodymass and energy.

Such possibilities have been extensively explored in terms of "human enhancement", as understood within schools of transhumanis, posthumanism or transformational activism -- notably as reprogenetics (a reframing of eugenics). However consideration has not as yet been given to "enhancement" as human miniaturization to reduce ecological footprint.

Regulatory focus on total family body mass: For example, if some families remain committed to having many more children, there may be no politically unacceptable need to discourage this (in violation of religious injunctions) when it is instead a simple matter to require that the children of such families then be of proportionately smaller size. This suggests the possibility of elaborating a norm for the total body mass of a single human family as a basis for ensuring appropriate resource requirements -- possibly resulting in newer additions to that family being of smaller size to meet those requirements.

Degree of size reduction required by planetary carrying capacity: Any study of the feasibility of this recommendation should clearly consider just how small it might be appropriate for humans to be in order to ensure a sustainable pattern of use of resources by the total human biomass. The widespread recognition of the future impact of nanotechnology may offer implicit recognition that humanity can be suitably "downsized" in phase with such developments.

Fiscal implications: Given the fiscal ambiguities associating size with adulthood and the consequent call on public resources, careful investigation is required into how fiscal incentives might be used to provide early encouragement of size reduction. Such investigations might fruitfully be associated with issues relating to costs of transportation, housing and use of utilities in the light of the diminished use of resources following significant body mass reduction..

Miniaturization of security forces: Given the great military interest in future miniaturization, whether for battlefield robots or for remotely controlled airborne devices, it is to be expected that defence research might take the lead in exploring size reduction of military personnel. As stinging insects continue to demonstrate, size does not matter in controlling behaviour of those of greater size. Given the deadly capacity of modern weaponry, even when miniaturized, much larger security forces could be maintained with a much lower call on resources.

Body mass of role models: This proposal raises interesting challenges for future leaders and role models who may be expected to be of relatively smaller, rather than larger, size to exemplify their credibility in response to the challenges of diminishing resources (cf Dan

Harbord, *Heights of Famous People*).

Implications for sport: Related adjustments may be appropriate in sporting activities in which physical size is a factor. Categories for smaller sized people could usefully be created (as in "flyweight" for boxing) and appropriately valued above those of (an increasingly obsolete) larger size -- in contrast with current practice. This could lead to team sports, such as football or basketball, either being based on teams of different sized players or, alternatively, having a mix of players of different sizes such as to constitute together a permissible total body mass.

Infrastructure implications: Aside from the advantages of size reduction, the transitional spread of sizes may necessarily impact significantly on urban planning, architecture and furniture design -- beyond that confronted by current requirements to facilitate access for the "disabled" (eg *Small People's Huge Problems*, *Russia Today*, 19 December 2007).

Aesthetics of size reduction: Consideration could be usefully given to the aesthetic standards associated with the art of bonsai, especially in the process of repositioning small as beautiful.

Miniaturization as an evolutionary process: As argued by J. Hanken and D. B. Wake (*Miniaturization of Body Size: organismal consequences and evolutionary significance*, *Annual Review of Ecology and Systematics*, 1993):

> Miniaturization, or the evolution of extremely small body size, is a widespread phenomenon in animals. It has important consequences for organismal biology and phyletic diversification above the species level. The miniaturized phenotype is a complex combination of ancestral and derived traits, including reduction and structural simplification, increased variability and morphological novelty

Some of the implication were later explored (P. J. Miller (Ed.), *Miniature Vertebrates: the implications of very small body size*. Zoological Society of London Symposia, 1996) as reviewed by Graham Stone (*On Being Very Small (Like Piglet!)*, *Journal of Biogeography*, 1998).

Fictional anticipation: Miniaturization is an option already explored in some "world building" computer games and simulations. It has been explored as a science fiction possibility by Kurt Vonnegut (*Slapstick*, 1976) which was an inspiration for the Human Reduction Institute's Very Small People Project (Ion Zwitter, *Expectations Shrinking for Very Small People Project*. *Avant News*, October 2005). *Slapstick* (adapted into a movie *Slapstick of Another Kind*, 1982) usefully explores the possibility of competitive miniaturization between nations, initiated therein by the Chinese to the point that they become so small that they cause a plague among those who accidentally inhale them, ultimately destroying western civilization beyond repair.

Cultural heritage: It is appropriate to note that many cultures have traditions recognizing the existence of (races of) "giants" in former times (cf Easter Island). It is possible that humanity has already been faced with a somewhat similar resource overshoot challenge and the need to respond to it. Some myths (as in Ireland and Cornwall; *A Guide to Little People*) suggest that racial miniaturization (possibly accompanied by a form of dematerialization or virtualization) may have been one option to ensure a higher quality of life.

Will size matter to future world leaders?

Jon Henley asks the question *Who is the Shortest World Leader* (*The Guardian*, 4th March 2008). Using the resources of Short Persons Support, which maintains a checklist (*Who's Who of Short People*), he notes that the leader in size reduction is Kim Jong-il (Great Leader, PDR of North Korea: 5.25 ft / 160.02 cms), followed on the list by Nicolas Sarkozy (President of France: 5.42 ft / 165cms) -- although recently overtaken by Dmitry Anatolyevich Medvedev (President, Russia: 5.31ft / 162cms).

Stuart Jeffries has provided a comparative review (*Does Nicolas Sarkozy have short-man syndrome? The Guardian*, 9 September 2009), distributed in print verion as *Who are you calling short?*

If the recommendation here for much shorter people is followed, it is to be expected that size will indeed matter, and that voters around the world will expect their leaders to be exemplars in this respect -- just as they expected larger size to matter in the past when great stature was a measure of great competence. Leadership capacity for a resource-challenged future will no longer be associated simplistically with great height or weight.

The shortest adult noted in the *Who's Who of Short People* is Gul Mohammed (1957-1997): 1.87 ft / 57 cms.

Penis-sized leaders would make a world of difference !

Catastrophe-engendered miniaturization: the "Lilliput effect"

Toba supervolcano: A measure of reality has been given to the legends of the previous point by the discovery in 2004 of traces in Indonesia of *Homo floresiensis*, a 1 metre high human species (*'Hobbit' joins human family tree*, *BBC News*, 27 October 2004). John Savino and Marie D. Jones (*Supervolcano: the catastrophic event that changed the course of human history*, 2007) discuss the impact on the evolution of *Homo sapiens* of the Toba (Sumatra) supervolcano of some 70,000 years ago. It has been postulated by Stanely H. Ambrose (*Volcanic Winter, and Differentiation of Modern Humans*, 2005) that the Toba catastrophe reduced the human population to 10,000 or even a mere 1,000 breeding pairs, creating a bottleneck in human evolution. The question raised by George Weber (*Toba Volcano*) is whether *Homo floresiensis* was in some ways an adaptive consequence of that catastrophe. Weber argues:

> Even more astonishingly, *Homo floresiensis*, were alive and well at least 12,000 years ago.... The "Hobbits" probably knew and were known by fully modern *Homo sapiens* for tens of thousands of years. There certainly are tales of "little people" among the inhabitants of Flores and these will now have be collected with a completely new sense of urgency and scrutinized from a

> completely new angle. It is much too early to say whether and how how the two species interacted, whether they avoided contact or traded or warred. Nor we do have any idea when and under what circumstances these astonishing pygmy people have become extinct - if they did.

Pygmy evolution: Notably as a consequence of the debates resulting from the discovery of *Homo floresiensis*, it has been recently postulated by Andrea Bamberg Migliano, *et al.* (*Life History Trade-offs Explain the Evolution of Human Pygmies*, Proceedings of the National Academy of Sciences, 10 December 2007) that:

> ... that human pygmy populations and adaptations evolved independently as the result of a life history tradeoff between the fertility benefits of larger body size against the costs of late growth cessation, under circumstances of significant young and adult mortality. Human pygmies do not appear to have evolved through positive selection for small stature -- this was a by-product of selection for early onset of reproduction.

"Lilliput effect": This term has been adopted by paleontologists to indicate the significant reduction in size of organisms that survive mass extinctions. The phenomenon was discussed in a meeting sponsored by the Paleontological Society, at a recent annual meeting of the Geological Society of America (Philadelphia, 2006). Reasons for size reduction include volcanic activity (as noted above), asteroid strikes (thought to have killed off the dinosaurs 65 million years ago), and the peculiar evolutionary pressures exerted by islands. As noted by Moises Velasquez-Manoff (*Scientists ponder 'the Lilliput effect'*, *The Christian Science Monitor*, 16 November 2006), it is not that the species that survived became small, but rather that smaller species often have shorter reproductive cycles, enabling them to quickly recover from population losses.

In thinking of your children, make a small contribution to the future of the planet
-- or, better still, an even smaller one

Case for conscious human evolution?

In the light of the probability of the collapse of planetary civilization (Thomas Homer-Dixon, *The Upside of Down: catastrophe, creativity and the renewal of civilization*, 2006; Jared M. Diamond. *Collapse: how societies choose to fail or succeed*, 2005), the above arguments regarding human evolution would seem to highlight the merits of anticipatory human size reduction through a consciously adopted strategy. This would increase the probability of surviving social collapse or the predicted mega-catastrophes. In the terms of Homer-Dixon, it would enable human systems to "degrade gracefully" through the next phase of the adaptive cycle -- as required for resilience.

Curiously a form of size reduction has long been envisaged in science fiction through the dissemination of human genetic material across the galaxy -- often as a last step in the face of imminent disaster. This is of course well within the scope of current technology. The envisaged possibilities of genetic engineering can also be understood as a deliberate effort to intervene in the processes of human evolution.

A subtler and more complex case might also be argued if "size reduction" was partly to be interpreted metaphorically to include a form of "ego size reduction", especially given the challenge of "ego size" to the viability of human remedial initiatives (as with the response to global warming) and the consequent survival of human societies. Such an argument might even be reconciled with biblical prophesies regarding the survival of the meek and any rapture "technology" required to "beam them up" (*But the meek shall inherit the earth*, *Psalm 37:11*; *Blessed are the meek: for they shall inherit the earth*, Matthew 5:5).

Related concerns have been explored in connection with "uploading" personalities, or mind uploading, into electronic storage systems -- "virtualization" -- as a means of ensuring survival independently of the physical body.

Termites as indicator of a viable future human evolutionary pathway?
Given the current possibility of human-animal reprogenetics, is it possible that eusocial insects such as termites represent a viable evolutionary pathway towards miniaturization (perhaps "chosen" millions of years ago in response to environment challenges)? Their "colonies" are analogous to human towns, numbering from several hundred to several million individuals. They are a prime example of decentralised, self-organised systems using swarm intelligence in cooperating to exploit food sources and environments that could not be available to any single insect acting alone. They are well adapted to challenging arid conditions and are capable of producing significant quanties of hydrogen -- making them one of the planet's most efficient bioreactors. The challenge for transhumanists, rather than mind uploading (or "downloading" personality) into a supercomputer, is to do so into the genetically modified organisms of the future -- of appropriate size and ecological footprint.

Population decimation: clarification of terminology

There are several ways in which the term "decimation" is used or understood:

1. most commonly it is currently used in the sense of mass destruction, massacre or annihilation, whether of people or animals (as in the case of the North American buffalo). It is notably used in relation to the probable impact of weapons of mass destruction or other forms of catastrophe currently anticipated (shortage of food, etc). A reduction of the population to a tenth of its original number may be inferred, but only in the loosest sense.
2. it was used to describe a form of military punishment used in the Roman Army whereby one soldier in ten was selected by lot and killed by the other nine. In this case, decimation derives from Latin meaning "removal of a tenth". An obsolete non-economic, juridical sense of "tithing", bears some relation to this process.

3. in digital signal processing, decimation is a technique of "downsampling" to reduce the number of samples in a discrete-time signal. The amount of that reduction, not necessarily a tenth, is precisely defined by a decimation factor (the ratio of the input rate to the output rate).
4. in statistics, where "population" refers to the size of any data sample, a "population decimation operator" may be used to shrink the population size (i.e. it "decimates" the population). As with the previous case (of which it is effectively a generalization), the degree of shrinkage is determined by a decimation factor, that does not necessarily result in a shrinkage of any given percentage (whether ten percent or ninety percent)

There are therefore **three possible kinds of confusion regarding "decimation"**. Firstly as to whether it implies destruction of some lifeform or whether it has a more general significance. Secondly as to whether it implies reduction **by ten percent** of the original amount, or reduction **to ten percent** of that amount (namely the elimination of 90 per cent). Thirdly as to whether the term is in anyway specifically related to "ten" or is merely used in an indicative manner.

Whereas the English language has a verb for reduction by half (*halve*), no such verb appears to exist to indicate reduction to a third, a quarter or a tenth. Verbs do of course exist to indicate splitting into thirds (*trisect, trifurcate*) or quarters (*quadrisect*, *quarter*), but without any implication that only one part would then remain.

No such verbs appear to exist for larger numbers, notably to indicate reduction to a tenth (with a degree of exception in the case of tithe). "Decimation" is used to imply such a reduction in the first case, but it is primarily associated with indiscriminate annihilation rather than any specific reduction in numbers. In the second case, it is used extremely precisely but to indicate removal of one tenth, leaving the remainder, namely a reduction of ten percent -- rather than ninety percent (as might have been inferred in the first case). In both cases the focus is on killing. In the third and fourth cases, although disassociated from violence to life in any form, "decimation" is only indicative of a reduction that has then to be precicely defined by a "decimation factor".

It is clearly problematic to use "decimation" to refer to any reduction in the size of the human population, since it is readily assumed that this implies the first case, namely involving violent killing in some form. The expression "population decimation" might also be understood as a consequence of some form of global birth control strategy. There is no clear term to indicate a reduction in height by ninety percent. Even statistical use of "decimation" calls for stipulation of the "decimation factor".

These somewhat confusing subtleties mean that the title of the above recommendation as **"Nonviolent Population Decimation" needs to be understood in context to mean reduction in the average height of the population to ten percent of the current size.** Use of the qualifier "nonviolent" should preclude any sense that deliberate killing is implied.

One of the advantages of the recommendation is that it specifically provides for a continuing uncontrolled increase in population numbers as required by many religions and human desire -- irrespective of whether this results in catastrophic decimation in population numbers. For example, climate scientist, James Lovelock expects the traumatized planet to be capable of supporting less than a tenth of its 6 billion world's population by 2100 (reducing it to some 500 million by annihilation of some kind), because the necessary remedial measures will not be in implemented in time (Decca Aitkenhead, *Enjoy life while you can*, *The Guardian*, 1 March 2008; Jeremy Lovell, *Gaia Scientist Lovelock Predicts Planetary Wipeout*, 2008). It is also the case that many religions favouring population increase expect some form of Armageddon long before that -- and live in expectation of such end times, supporting faith-based governance to that end. Whichever the case, each is considered as an inevitable, violent form of population decimation -- whether or not the violence is understood as deliberately engineered (see *Spontaneous Initiation of Armageddon: a heartfelt response to systemic negligence*, 2004)

In this nonviolent recommendation, however, it is not the number of people that is decimated but their height. However, as implied by Lovelock and seemingly intended by major religions, the current strategy could indeed be understood as "nonviolent population decimation" since the violence of that decimation is only a consequence of an essentially nonviolent strategy of avoiding the issue of overpopulation.

Human size reduction is a viable long-term response to climate change
whether Warming OR Cooling
Why aren't we gene editing people to be my size? (*BBC News*, 3 February 2017)

The actress Kiruna Stamell who has dwarfism. She tells the Today programme society should be working to make it easier for people to live with a disability and wonders why for global warming's sake we aren't gene editing people to be her size.

Anthony Watts, *Where have all the sunspots gone?* (February 2008):

Given the current quietness of the sun and it's magnetic field, combined with the late start to cycle 24 with even possibly a false start, it appears that the sun has slowed it's internal dynamo to a similar level such as was seen during the Dalton Minimum. One of the things about the Dalton Minimum was that it started with a skipped solar cycle, which also coincided with a very long solar cycle 4 from 1784-1799. The longer our current cycle 23 lasts before we see a true ramp up of cycle 24, the greater chance it seems then that cycle 24 will be a low one.

This explains recent discussion about global cooling.
A Dalton type solar minimum would be very bad for our world economy and agriculture.

http://www.swpc.noaa.gov/SolarCycle/
http://www.spaceweather.com/java/sunspot.html

If the converging cycles are the proximate causal factors, there is a real possibility of a "skipped solar cycle" or an average sunspot maximum being the lowest since the 1790s-1820s. Combine the effects of global cooling with "Peak Oil", i.e., peak production of cheap fossil fuels, and the prospects for the coming decades are rather grim, indeed.

The question is which of the above interpretations of
Nonviolent Population Decimation
is the more ridiculous as a "strategy" for humanity at this time?

Film development of the above possibility -- *Downsizing* (2017)
Downsizing is a 2017 American science fiction comedy film which tells the story of Paul and Audrey Safranek, a couple who decide to undertake a newly invented procedure to shrink their bodies so they can start a new life in an experimental community. When Audrey refuses the procedure at the last minute, Paul has to reassess his life and choices after befriending an impoverished activist. Downsizing premiered at the 74th Venice International Film Festival on August 30, 2017, and was theatrically released in the United States by Paramount Pictures on December 22, 2017. In the future, searching for a way to solve overpopulation and global warming, Dr. Jørgen Asbjørnsen invents "downsizing", a process to shrink people to a height of five inches (12.7 cm); he and his wife Anne-Helene become part of the first human test subjects once the process is proven safe and demonstrate it to the world. While the inventors advocate that downsizing is environmentally friendly through the reduction of waste, protagonists argue that its benefits extend far beyond that and improve one's life through the increase in value of their money. The film is included in the *Wikipedia List of films featuring miniature people* Reviews: • Jonathan Romney: *Alexander Payne on Downsizing: 'The film isn't a major statement – it's a metaphor'* (*The Guardian*, 7 January 2018) • Michael Svoboda: *Downsizing: Matt Damon Takes on Climate Change With Humor Yale Climate Connections* (*Yale Climate Connections,* 1 March 2018) • Tasha Robinson: *Downsizing takes the dullest path through a brilliant premise* (*The Verge*, 14 September 2017) • Lawrence Wollersheim: Why the Movie Downsizing Should be Seen by Everyone Who Cares About the Environment? (*Job One for Humanity*, (1 May 2018) • Marshall Shaffer: *'Downsizing' Review: Matt Damon Shrinks Himself in Alexander Payne's Sci-fi Satire* (*Film*, 15 September 2017) • Owen Gleiberman: *Film Review: 'Downsizing' Alexander Payne's science-fiction comedy about humans who get miniaturized to save the planet* (*Variety*, 30 August 2017) • A. O Scott: *In 'Downsizing,' Matt Damon Sweats the Small Stuff* (*The New York Times*, 21 December 2017) • Sheila O'Malley: *Downsizing* (*Roger Ebert*, 22 December 2017) • Matt Reynolds: *Downsizing is a big film that gets lost in shades of Matt Damon beige* (*Wired*, 23 January 2018) • Robbie Collin: *Downsizing review: Matt Damon's shrinking comedy is big on ideas* (*The Telegraph*, 25 January 2018) • Richard Brody: *The Outsized Pleasures and Failures of Alexander Payne's "Downsizing"* (*The New Yorker*, 29 December 2017) • Nigel Andrews: *Downsizing -- Alexander Payne's film is a preachy affair* (*Financial Times*, 24 January 2018) • David Sims: *Downsizing Has Big Ambitions but Little Payoff* (*The Atlantic*, 22 December 2017) • Anne Thompson: *'Downsizing': What Went Wrong with Alexander Payne's Social Satire* (*IndieWire*, 28 December 2017) • Andrew Lapin: *'Downsizing': A Tone-Deaf, Less-Than-Incredible Shrinking Satire* (*NPR*, 21 December 2017) • Henry K Miller: *Downsizing plots an unpredictable course into American purgatory* (*BFI*, 25 January 2018) • Thomas Sotinel: *"Downsizing": la fin du monde vue d'en bas* (*Le Monde*, 10 janvier 2018)

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