



The sustainability of human populations: How many people can live on Earth?

Martin Desvaux

Summary and key points

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Human impact on the planet has increased massively in the modern era, causing deforestation, soil erosion, increased salinity of the soil, pollution, waste disposal to landfill, desertification, declining fish stocks, biodiversity loss and climate change. The Earth can no longer support the number of people who live on it. It crossed the boundary to ecological overshoot in the 1980s: human demands on the planet now run at 25 per cent above planetary biocapacity. This 25 per cent overshoot is projected to rise to nearly 100 per cent by 2050 when humankind will need almost two Earths to support it.

The sheer strain on the global ecosystem placed by such numbers means that the UN's prediction of a world population of over nine billion by 2050 will never be realised. Instead, resource wars and starvation threaten the worst population crash in the history of humankind. There is an urgent need for national strategies on sustainable population not only in the UK but in all countries. Politicians need to demonstrate courage and leadership on this issue: they must persuade their nations to accept the necessity of smaller families and provide the means for people to reduce their family size.

Ecological footprinting data suggest that a sustainable global population is around 2-3 billion people. For the UK, the corresponding figure is currently between 17 and 27 million. In the UK, target reduction in CO₂ emissions will be cancelled out by population growth, leaving the country with 50 million "too many" people by mid-century.

Key Points

*In 470 BC Plato declared: "A suitable total for the number of citizens cannot be fixed without considering the land..." Control of death without a corresponding control of birth rate has caused an 11-fold explosion in population to over 6.7 billion in just 250 years. In the modern era, human population has increased two million times faster than in the prehistoric era, when population grew at an average of seven *people* per year.

*The impact of humanity has been expressed in the so-called Commoner-Ehrlich Equation: $I = P \times A \times T$. This states that *impact* (*I*) on the environment is proportional to population size (*P*), *affluence* (*A*), defined as the resources a population consumes and wastes, and the *technology* (*T*) a society uses. However, reducing *impact* by decreasing *affluence* (consumption) only partly addresses the problem since in many regions, for example Africa, population growth is exceeding growth in affluence. *Technology*, meanwhile, tends not to "decrease": it can reduce the effects of affluence but its benefits in energy-saving tend to be cancelled out since businesses use it to encourage consumer spending and maximise economic growth. The *population* element is rarely addressed.

*The limit to population at any given time is determined by the planet's ability to support that population's impact indefinitely. Ecological footprinting was developed in the 1990s to measure this impact. It assesses the earth's biological capacity against the human demands on it - the footprint - using a standardised unit of land area, the *global hectare*.

*In 2003, with a total of 6.3 billion humans sharing the earth's biocapacity of 11.2 billion global hectares (gha), the biocapacity available to sustain each person was 1.78 gha.

However, the average individual footprint was 2.23 gha, an excess over biocapacity of 25 per cent. The result is the unsustainable consumption of land and resources - for example, the inability of carbon sinks to absorb humanity's waste CO₂. In 2003 one and a quarter planets were needed indefinitely to sustain the population of 6.3 billion.*

*The UK's footprint is 3.5 times greater than its biocapacity, reflecting both its high population density and its affluence. If the whole world consumed and generated waste like the UK, it would require 3.5 (an additional 2.5) planets to sustain the human race.

*Given total global biocapacity of 11.2 billion gha, an average individual footprint of 2.23 gha will sustain only 5.1 billion people. This gives an immediate estimate of world overpopulation - 1.2 billion people in 2003.

*National footprints vary widely. If everyone lived with an average EU lifestyle of 4.8 gha *per capita*, Earth could sustain only 2.34 billion people; an American lifestyle of 9.4 gha/cap could sustain only 1.2 billion. Both figures are far in excess of the 2003 world biocapacity of 1.78 gha/cap and emphasise that the developed world enjoys its affluence only because people in developing countries have a much lower footprint.

*In 1961, with a footprint of 1.5 gha/cap, the world's population of three billion was sustainable. Between 1980 and 1990 it moved into overshoot. Until 1990 the trend to overshoot was attributable to both increasing ecological footprint and growing population. Since 1990, however, population increase has become the main driver of overshoot.

*With a footprint of 5.6 gha/cap, the UK's sustainable population is 17 million. The UK thus has currently 43 million more citizens than can be sustained in the long term without relying on other countries for food imports and for the "disposal" of its waste CO₂ emissions. To live sustainably, a UK population of 60 million would have to reduce its average individual footprint to 1.6 gha - a "lifestyle" equivalent currently to that of countries such as China, Paraguay, Algeria, Botswana and the Dominican Republic.

*If the UK met the Government's target of a 60 per cent cut in CO₂ emissions by 2050, its *per capita* footprint would decrease from 5.6 to 3.7 gha, implying a sustainable population of 27 million. However, UK population is projected to grow by a further 16 million by 2050, to 77 million. In terms of sustainability, a 60 per cent cut in emissions - even if achieved - will thus be more than cancelled out by population growth: in 2050 there will be 50 million UK citizens more than the UK can sustain.

*In the unlikely event that the UK could cut its CO₂ emissions to zero, the maximum sustainable population would be 40 million if its non-carbon footprint remained constant. In reality, a "zero-carbon" UK could never reach sustainability without population reduction: the lifestyle reductions demanded would be too great. The Government should introduce a strategy to encourage UK population downwards towards 17-27 million.

*There is an urgent need for national population strategies in all countries. It is the sheer weight of human numbers that is causing the overdraw of natural resources. If this continues uncorrected, a population crash is inevitable. It is neither sufficient nor realistic to try to apply technology to solve merely the *affluence* element in the Commoner-Ehrlich equation. *Population* needs deep and urgent scrutiny; it has been avoided for far too long.

*The data suggest a sustainable global population of around two to three billion, given an ecological footprint of 3.5 to 5.5 gha/cap. For the UK, the figure is 17-27 million.

*All figures based on Living Planet Report 2006 (WWF, Global Footprint Network, Zoological Society of London)

The full version of this paper can be found at www.optimumpopulation.org/HowManyPeople.pdf

Optimum Population Trust

Tel: 07976-370221 www.optimumpopulation.org info@optimumpopulation.org February 2008
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