



INCLUSIVE SOCIETY INSTITUTE

Op-ed

Sustainable population and possible standards of living **By Anton Cartwright**

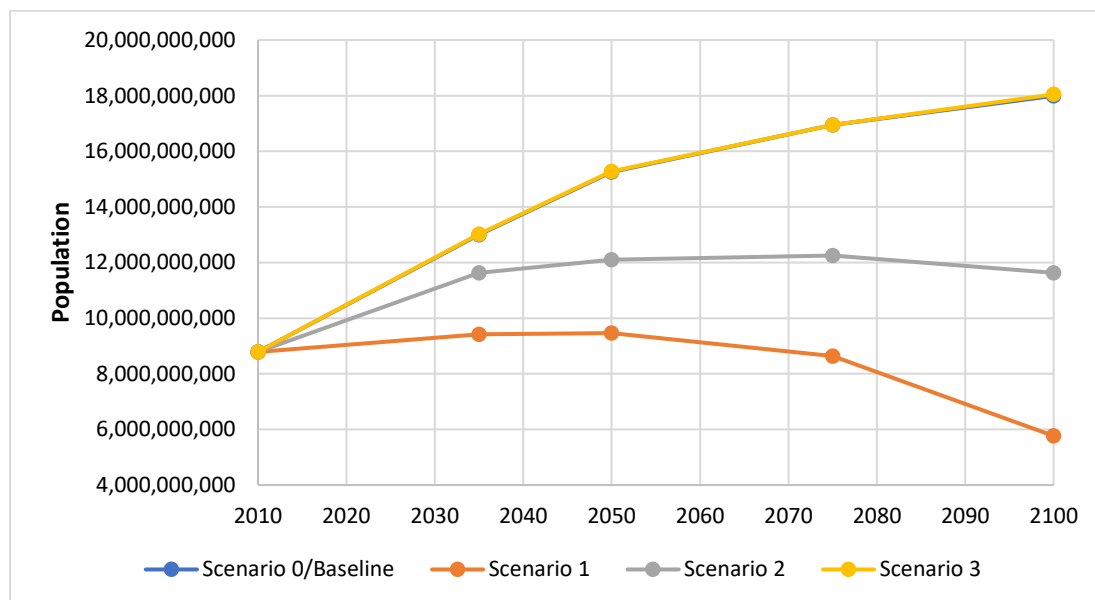
Anxieties about the implications of population growth and environmental sustainability recur throughout research over the last 500 years. Insecurity about not having sufficient food, water and other resources, and perhaps begrudging the need to share the existing stocks amongst growing numbers, has driven progress in industry and agriculture. ‘Scarcity’ is, after all, a founding assumption of much economic theory. The same insecurity has driven anti-social and ecologically destructive behaviour including over-extraction, hoarding and nationalism. The thesis of the *Avengers: infinity wars* anti-hero, Thanos, is that eliminating half the world’s population will double the remaining people’s well-being. The movie is intended as satire but is based on an all-too-common societal assumption regarding the relationship between population size and well-being, not to mention the writings of ecologists such as Garrett Hardin and Paul Ehrlich.

As the human population breaches 8 billion in 2022 and the evidence of biodiversity losses, soil degradation, rising temperatures, droughts, fires, floods and disease stacks up, it seems important, and perhaps innately human, that the question ‘what is the Earth’s carrying capacity’ be revisited. There have been many studies of this topic since Antonie van Leeuwenhoek estimated the Earth’s carrying capacity at 13 billion in 1679. His calculations involved an extrapolation of the relationship between inhabitable land and wheat production in the Netherlands and oddly, given their flimsy premise, his conclusion still seems reasonable. Determining exactly what is reasonable, however, is not straightforward. This is one arena in which more research seems to lead to less consensus. A review of existing studies showed a range between 0.5 billion and 1 trillion. Equally clear, is that this is an emotive topic, and one in which all researchers struggle to disassociate from their ideological baggage. Thomas Malthus famously drew attention to the distinction between gross output of an economy and per capita consumption in 1798, to predict that population growth would outstrip food supply and lead to famine. Less well known is his religious opposition to contraception and his theoretical opposition to the liberal writings of Marquis de Condorcet, William Golding and his own father.

In a piece of research commissioned by the Global Challenges Foundation (Sweden) and the Inclusive Society Institute (South Africa) we did our best to learn from the patchy history of research on carrying capacity. Our model of population growth recognized that there are biophysical limits that constrain human population but did not assume to know which of these - land, water, a particular crop nutrient, disease or civil strife for example - would become binding on population growth first. Instead, we constructed a dynamic model in which all parameters interact, aimed at capturing the “living fabric of ecosystems and biodiversity” that supports all life on Earth including human life. The study modelled the interaction between land for food production, waste disposal and habitation respectively, water, food availability, greenhouse gas emissions and income in seven distinct regions of the world, based on actual data for each region; 12 Megajoules of food was assumed to be the minimum number of calories required to sustain human life. The model contains positive and negative feedback loops, and explicitly recognized human ability to adapt and innovate, a common failing of many early studies.

Of course, the nature of human agency is difficult to predict. There is evidence, including from recent droughts in Cape Town, to suggest that people confronting environmental collapse and scarcity are capable of extraordinary collaboration, adaptation and sacrifice. But there are also many examples in which environmental pressures lead to social instability, opportunism and vicious cycles of ecological degradation. To accommodate a range of possibilities, the study adopted four different scenarios (S₀ - S₃) representing different configurations of innovation and sustainability based on urban density, solid waste per unit of GDP, CO₂ per unit of GDP, grain yield per hectare of land, land degradation and the water required per unit of food. Under the scenarios the current reality for these parameters in each of the seven regions was adjusted up or down by a fixed percentage.

Global carrying capacity under the normative baseline scenario was modelled at 17,99 billion. Across the scenarios global carrying capacity ranged from just 5.77 billion in a world in which negative feedbacks resulting from pollution, the loss of ecosystem services and diminishing returns to investment in resource extraction persist, to 18.04 billion where technological innovation is high, technologies and investments are shared, materials flow in circular loops rather than being dumped as waste, cities are compact and well-governed and greenhouse gas emissions are brought under control.



The respective scenarios do not have probabilities attached to them, but the current socio-economic trajectory is assumed to be somewhere between 6 and 12 billion. If this is grounds for concern, it should be clear that there are socio-economic configurations and technologies available that could enable a doubling of the current population. The study is also clear that consumption within affluent economies is much more damaging to carrying capacity than population growth on its own.

The study raises the idea that slower population growth in low-income countries, and smaller populations in affluent economies, could allow time to adopt the required technological and socio-economic changes. Many past population policies have not only been unsuccessful, but have been sinisterly motivated by fear of military might and social instability in former colonies, racist, sexist and religious ideologies. Effective population policies have tended to focus on women's rights and agency and delayed the age at which women have their first child by providing economic and education alternatives. Indeed, progress on this front is behind the precipitously falling fertility rates in all regions of the world. Given that human population is likely to top-out at 11.2 billion, some of the scenarios modelled in our study are purely hypothetical.

So how many people can the Earth support? The answer is unambiguously “it depends”. It depends on whether we see people as liabilities or finds way to recognize and harness their innate potential. It depends on how people seek to pursue their well-being, dispose of their byproducts, and whether people can be made to feel sufficiently secure about having ‘enough’ to share technologies and investments. On this, the study draws an optimistic conclusion: there are social, technological and economic constructs at hand that would enable the Earth to support double the current population. Necessarily these would involve abandoning the idea of ‘waste’ and internalizing all economic ‘externalities’. Beyond that it would require tapping the resourcefulness, cooperation and collaboration that enabled the remarkable success of the human species over the last 200,000 years (and particularly the last 200 years).

Competition has, of course been a feature of this success, but the business case for competition should not be wholly transposed onto societies by creating an ideology of scarcity, and cooperation would need to be extended from humans to nature. The findings of the study suggest that a more cooperative political economy, built on the type of collaboration, resourcefulness and alignment with the regenerative capacity of nature that made humans successful as a species in the first place, holds the key to not just sustainability but also human well-being.

Anton Cartwright was the lead researcher for the Inclusive Society Institute’s (ISI) research into global sustainable population. The ISI research formed part of a multi-organization collaborative research project commissioned by the Global Challenges Foundation, who are based in Sweden.